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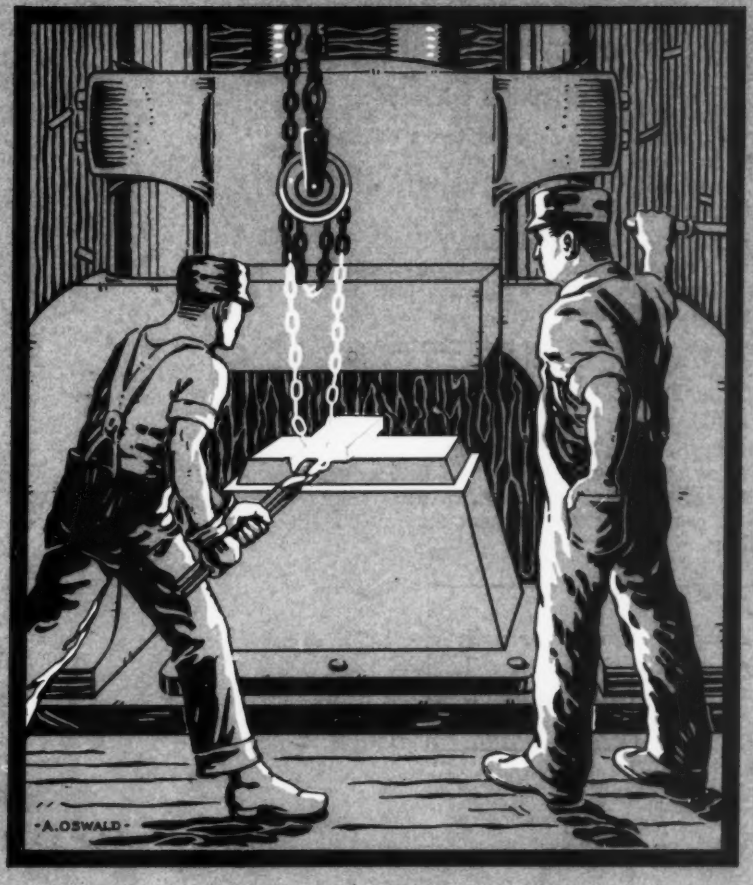
THE INDUSTRIAL ARTS MAGAZINE



SEPTEMBER 1922

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INDUSTRIAL-ARTS MAGAZINE

Volume XI SEPTEMBER, 1922 No. 9

Industrial and Vocational Teacher Training

Homer J. Smith, the University of Minnesota

Article I.

A Study of Standards of Teaching Fitness.

THE study here reported was made with purpose to clarify thought and to encourage more concerted action relative to the preparation of teachers of the industrial and vocational subjects of our school programs. The aims, courses, and the means of their attainment are far from clear-cut in these special fields. Teachers and administrators of manual subjects, as well as workers in more academic fields, discuss the work in terms not assigned exact meanings nor uniformly interpreted. There is difference of opinion among us regarding the objectives of the varying types of classwork. We are not committed to a common belief as to the requisites of teaching fitness for the varying class situations. The departments and institutions of training are found offering courses and curricula with little recognition of the fact that their output must be specially designed. The writer hoped to make possible the improvement of these conditions. He believes the facts and combined opinions here made available can serve, in some measure, to give to these special fields the trend toward definite preparation that has begun to be evident in the more academic specialities. The present article reveals those characteristics and attainments thought to be necessary for success in this branch of our profession. It is an analysis of the literature dealing with the problem under consideration. A second article will bring to our aid the combined judgments of about three hundred persons as to the relative importance of the characteristics named, the individuals consulted being those whose training and occupations constitute them a select group, prepared to judge.[1] A third writing will summarize typical curricular offerings in schools of training and will afford us opportunity to compare them in the light of our standards of fitness. These three pieces of work, by reason of their relationships, are easily unified and result in a number of definite *conclusions*. They seem to open the way for standardization in so far as it may seem advisable. The final article will summarize these conclusions and suggest such standardization.

A Measuring Instrument Needed.

Judgment or measurement of anything presupposes a measuring instrument, more or less definitely conceived in its unit divisions and convenient of use. It is desired that the results of measurement be accurate and that the process be short. The quality or property to be judged determines in great degree the closeness with which we can evaluate it. The ultimate basis of passing judgment on teaching fitness is, doubtless, the *results of teaching*, but we have yet made little progress in measurement of these results. It seems unwise to delay action until the ultimate can be attained. We must arrive at tentative criteria, useful at once, in evaluation of the preparation and efforts of those in service or training.

The present study has to do with fitness for teaching in certain special fields of the school service and we are faced at the beginning with the necessity of choosing or devising an instrument of measurement. Just what natural and acquired characteristics a person should possess to be a successful teacher for the standard class and school has long been a question engaging the attention of students of education. There is an extensive literature of the subject. Much that has been written is mature opinion, the result of long and varied experience in teaching and in supervision. Some studies have been made through which there have been developed scales for the rating of teachers-in-service or for the assistance of those who must select a teacher from a group of candidates. The combined elements of the best of these printed scales has seemed to be a convenient point of departure in the making of a list of qualities for use in the work upon the present problem.

What 23 Rating Scales Include.

Examination was made of 23 scales[2] presented in as many separate periodicals, and a count was made of the recurrence of the qualities and attainments included.

[1] Many readers of this magazine contributed to the study in hand by replying to a questionnaire on teaching fitness for four distinct types of work. Their cooperation is gratefully acknowledged.

[2] The reference list on rating scales is reserved because of lack of space, but will be mailed to any reader who desires it.

These 23 scales are all that could be located, in form sufficiently definite to permit of classification of qualities. Writings which set forth negative qualities, that is, the causes of failure in teaching and class management, were not used, because they could not, with certainty, be translated into affirmative expressions. It was noted early in the canvass that the elements most nearly common to all scales are few in number and variously named. A characteristic given place, with five or six others, as a main head in one scale was found to be listed as a sub-head in another. The only way adequately to show what qualities are judged desirable seemed to be to chart those most often mentioned, in whatever rank of importance. (We were concerned only with the formulation of a list with which to work, and not with a frequency table of the qualities named.)

The combining of these various sets of desirable qualities was neither a simple nor an exact task. All scales were first cursorily examined to find outstanding qualities which were rather common to all, even though variously expressed and variously classified as primary or secondary qualities. This preliminary canvass discovered nine main characteristics of fitness or requisites for teaching success. They are (1) adaptability and tact, (2) executive ability and class management, (3) general scholarship, (4) knowledge of the subject to be taught, (5) good character, (6) personality, (7) health and appearance, (8) methods, and (9) professionalism. These nine were listed as the basis of a frequency table and each scale was given thorough examination with reference to each of the nine qualities. (Space does not permit of the description of this process, nor does it seem necessary to show the resulting table.) In this way it was determined how the 23 persons who designed the scales compared in their thoughts concerning the importance of these named attributes and attainments. This thorough checking confirmed the opinion that the nine selected are not only most frequently used but that they include, in effect, nearly every element mentioned less frequently. Their average used is nineteen-plus, out of a possible 23 times, i. e., each appeared, on the average, in nineteen of the 23 scales. These nine characteristics, then, formed a basic list and were held to be increased in number, if necessary, by an analysis of the special literature on teaching fitness for industrial and vocational classwork.

Additional Requisites Mentioned in Special Literature.

Having summarized the qualities of teaching fitness most commonly employed in rating scales, we turned next to the literature of industrial and vocational education to determine whether for these special fields of work other attainments or qualities are desirable. Extracts from the writing of various specialists, as they appear in a mixed list of sources and from the reports of special committees of national organizations as they appear in "proceedings," were studied as sampling the thought of administrators and others in this particular branch of the profession. (Mention of some of the men referred to will give the reader a measure of the authority represented in the group—Taylor, K. G. Smith, Dooley, E. E. Ericson, Carris, Allen, H. B. Smith, Bawden, Gerwig, Jacobs, McKinney, Rodgers, Shepherd, Siepert, Snedden, Whitcomb, etc.).

This section of the work is weak by reason of the absence of quantitative facts. It has been impossible, because of the great amount of the special literature, to present actual numerical and percentage frequencies of mention of either the requisites of teaching success or of the types of teaching positions. The qualitative statements, however, seem worthy because of the high standing and the representativeness of the persons and committees quoted and the sources to which reference was made.

The extracts, being typical of the printed expression on the subject in question by specialists and committees of national organizations, one is led to conclude that the nine characteristics previously arrived at are desirable but not quite sufficient for teachers of industrial and vocational classes. A tenth must be added which for convenience we shall term *Industrial Experience or Contact.*

Search of the special literature has also brought out that there are recognized four large divisions of the industrial-vocational branch of the teaching profession. We find frequent reference to manual training work, general industrial training, vocational shopwork, and the teaching of the related subjects. Other terms appear, and there are mentioned various sub-divisions or specialities, but these four may be said to cover the full range of the special service.

The ten characteristics of fitness and the four teacher types will next be defined and subsequently an attempt will be made to show which of the characteristics should be thought of as having greatest importance in the preparation of men for each of the four types of teaching.

Definitions for the Purposes of This Work.

The Types of Teachers. The following definitions were framed by the writer, to be included in a questionnaire blank used for securing expert opinion of teaching fitness. It was desired to have the ten selected characteristics given rank order of importance for each of the four types of teachers, and it seemed necessary that all persons cooperating should have conceptions of the work of these teachers as nearly identical as possible. The type names, although clearly suggestive to those acquainted with the literature of industrial and vocational education, did present the possibility of varied interpretation. The definitions were made a part of the questionnaire blank.

A Manual Arts Teacher—one who teaches woodwork, metal work drawing, etc., in an elementary or a high school, for general educational purposes (not for vocational training).

A General Industrial Teacher—one who teaches the elements of materials and processes in several lines (woodwork, sheet-metal, electricity, etc.), in small schools, the course being a composite one or a series of separate experiences and presented by one person, rather for information than skill.

A Vocational Shop Teacher—one who teaches a trade or vocation in a senior high school, a vocational school, a part-time class, or an evening school, the aim being preparation for a life work.

A Related Subjects Teacher—one who teaches mathematics, science, drawing, safety, etc., as related strictly to vocations, incidentally or in scheduled class periods.

The Characteristics.

The following ten definitions are likewise the work of the writer. Personal judgment was supplemented, in their making, by details offered in connection with some of the rating scales previously mentioned. These definitions did not form a part of the questionnaire blank, but may well have been included. If confusion as to meaning of them existed in the minds of the persons cooperating it was brought to my attention in but two instances. Two persons interpreted *Professionalism* to be an undesirable quality and expressed surprise to find it listed with nine other essential qualities of fitness.

Adaptability and Tact—ability to adjust himself to unusual class conditions and to the varying situations which face him in his professional and social contacts.

Executive Ability and Class Management—the quality of leadership and of persistent constructive effort as they may affect the conduct of students in the schoolroom, the supply and disposition of equipment and materials, and the physical condition of a given department.

General Scholarship—the grasp of information and values in a wide range of subjects, coupled with accuracy of oral or written expression.

Knowledge of the Subject to be Taught—the ready command of subject-matter within a field, far in excess of what is expected to be acquired by the average student of the group. (For the teaching of shop processes this is assumed to be the possession of skill in handling tools, machines, and materials as they are handled in actual practice.)

Good Character—the condition of being above suspicion of immorality, vice, depravity, bitterness, etc., and of possessing such qualities as honesty, kindness, and fidelity.

Personality—the possession of the good traits that give one individuality in the minds of those who know him—mental and physical poise, earnestness, and the active and energetic support of what is seen to be for social betterment.

Health and Appearance—personal attractiveness as dependent upon a healthful, vigorous appearance and the absence of distracting conditions of body or dress.

Industrial Experience or Contact—the earning of one's livelihood for a considerable period by some industrial work or the gaining of information about certain industrial experiences without actually participating in them for pay.

Methods—knowledge of how to adapt one's means of presentation, drill, and testing to the abilities and needs of the groups concerned; skill in motivation; and the certainty of gaining proper student activity.

Professionalism—the desire for growth in knowledge of the subject and in teaching power; a general attitude of helpful cooperation with all who endeavor to promote educational accomplishment.

The Questionnaire.

The qualities or attainments which seem uniformly to affect judgment when the fitness of a person for teaching any industrial or vocational subject is being considered were worked into a questionnaire blank so that a combined ranking might be secured and the relative importance of the qualities be known. Alphabetical arrangement was given to them in making up the check-sheet, except that those of very like kind were brought together for greater ease in ranking. The ten were placed in exactly the same order four separate times on the same blank. Above each of the four lists was placed the type name of a teacher with definite duties—manual arts teacher, general industrial teacher, vocational shop teacher, and related subjects teacher. It was assumed that the varying aims of the school subjects necessitates varying preparations for teaching these subjects. The characteristics being common, it was reasonable to expect them to be unequally stressed for the four teacher types. (This expectation is borne out, as later pages will reveal.)

For each of the four teacher-types the person addressed was requested to rank the ten characteristics in importance from one to ten (1 to indicate greatest importance). Questionnaires were addressed to all (1) *State and Federal Supervisors of Trade and Industrial Education,* (2) to the *Supervisors of Industrial and Vocational Education* in the public schools of *cities 50,000 and more* in population, and (3) to the *Heads of Industrial and Vocational Teacher-Training Departments and Institutions.* It is a matter of regret that lists of such officers are not available in more complete and convenient form. Many offices rather than officers were addressed, many communications were returned unopened, and the percentage of returns was thus affected in some measure. Despite these last named considerations there is reason for satisfaction with the interest manifested in the study. The percentage of returns is not low; the total number is sufficiently large to give fairly reliable results.

The Replies Used.

Thirty-three (33) usable replies were received from state and federal supervisors, this number being about sixty per cent of the possible number of replies; all of the persons addressed were not reached. Seventy-five (75) usable replies came from city supervisors in towns of 50,000 and more population. This number is slightly in excess of one-half the number of such cities. The return is, however, to be considered as being about seventy per cent, because some cities employ no such special officer, and the office rather than the incumbent was addressed in a majority of these cases. Fifty-four (54) usable replies were mailed by heads of teacher-training departments and institutions, which number is a return of about seventy-five per cent of those sent out.

In addition to these replies, specifically requested, 131 others were received, up to the time of closing receipts, through the interest of those to whose attention the work was called. Some administrators requested additional questionnaire blanks and had them filled out by teachers in their employ. In three or four cases teachers-in-training were asked to fill blanks as a class exercise. This interest was gratifying, indeed, and the data so received were of much importance as they afforded a random sampling of opinion from within the ranks of another group closely concerned. After tabulation had been completed approximately one hundred replies were received. Had these been used, the results would not have been materially changed.

In all, then, 293 individual replies were used, which number is in excess of the number of people first addressed. In so far as a true percentage of returns may be calculated under such circumstances, it seems justifiable to set the number at seventy-five per cent returned and usable. The data seem in amount and source to be sufficient and worthy.

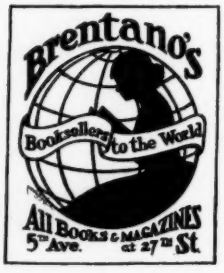
Unused Data and Supplemental Notes.

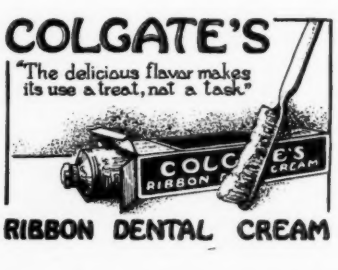
Nineteen of the persons cooperating in the study did not properly interpret the method of ranking called for or felt that it was impossible to assign unequal values to all characteristics named. These nineteen replies were not used, but have been tabulated because of their value in influence upon the conclusions drawn later. Some felt that "all are necessary; none can be omitted," which was assumed from the first. Some gave first rank to two or three characteristics, second rank to two or three others, etc., having misinterpreted the directions. A few gave expression, through notes written on the blanks or by letters, to the fact that they experienced difficulty in giving the ten characteristics a definite order of importance. Three or four persons said they were unable to rank them. Extracts are here given, so that the thought of this *group may be recorded.* "It is difficult to number these in 1-2-3 order, as most of them are essential and one or two of them seem to be a reiteration of others in the list." "I do not rank *health* or *good character,* because no teacher should teach without these prerequisites." "I do not underestimate good character, but it seems to be rather out of line with other qualifications mentioned." "I feel that the ratings are really too general to be of real service; thus, *adaptability* and *tact* are definitely related to *personality; health* is a prerequisite for any work, as is also *good character.*"

Two considerations are urged in reply to these notes: (1) The ten characteristics used in the questionnaire being those most frequently mentioned in the literature of the subject, their use for this study will either bind us more or less firmly to them as attributes for judgment or it will lead us to more definite thinking and to the stressing of qualities other than those listed. (2) There may have been misunderstanding as to the results expected from combining the various judgments. It was not intended to assign any one characteristic *very great importance* and then to place the other nine at equally-distant points below it, to the position of *no importance.* The statistical method next described makes it possible to assign a given characteristic *any importance that we will* and to arrange the others above or below it at unequal distances.

The line of projection in this case turns out to be a scale of points placed at unequal distances from each other and not arranged as the inch marks on a rule. The ten characteristics take a definite rank order for each teacher type, but distribute themselves scatteringly from the point of lowest importance. Article Two will show the rank orders, the projected lines, and comparison graphs—all based upon the opinions of about three hundred men competent to judge.

[TO BE CONTINUED]





EXAMPLES OF WORK BY GRADUATE STUDENTS OF THE COMMERCIAL ART DEPARTMENT OF THE NEW YORK CITY SCHOOLS. DR. JAMES P. HANEY, DIRECTOR OF ART IN HIGH SCHOOLS.

Hepplewhite Furniture

L. G. Martin

GEORGE HEPPLEWHITE was a noted English furniture designer of the eighteenth century. His work showed the influence of the French, of the Adam, and of the then current English styles. A book of designs called "The Cabinet Maker and Upholsterers' Guide," representing the work of A. Hepplewhite & Company, was published in three editions after his death. Much of the work of Hepplewhite was ornamented with painted decorations of medallions, ribbons and flowers in the manner of Angelica Kaufman. Light-colored woods like satinwood, sycamore and chestnut were used.

2. HEPPLEWHITE WRITING DESK, 1780-1800. DESK OF MAHOGANY WITH SATINWOOD VENEER. THE UPPER SECTION IS FITTED WITH TAMBOUR DOORS, PIGEON HOLES AND SMALL DRAWERS. SQUARE TAPERING LEGS WITH INLAY LINES.

1 HEPPLEWHITE SIDEBOARD 1790-1800. SIMPLE DESIGN WITH SERPENTINE FRONT AND SQUARE TAPERING LEGS. FINE INLAY LINES ON LEGS AND DRAWER FRONTS. OVAL SHAPED DRAWER PULLS

3. HEPPLEWHITE TABLE, 1775-1800. CURLY MAPLE AND SATINWOOD. THE TOP AND DRAWER FRONT IS CROSS-BANDED AND HAS INLAID MARQUETRY DECORATIONS. THE DROP LEAVES ARE SHAPED.

4. EARLY HEPPLEWHITE CHAIR. SHIELD BACK WITH SERPENTINE TOP RAIL AND LYRE SHAPED CENTER SPLAT, WHICH IS PIERCED AND CARVED. THE SEAT FRAME IS CURVED IN FRONT. FRONT LEGS MOULDED ON TWO SIDES.

5. HEPPLEWHITE CHAIR LATE 18TH CENTURY. MAHOGANY OVAL-BACK, WITH PIERCED CENTER SPLATS AND SHAPED SEAT FRAME, THE OVAL-BACKS ARE QUITE FLAT AND HAVE A MOULDED FRAME. SEAT COVERED WITH VELVET.

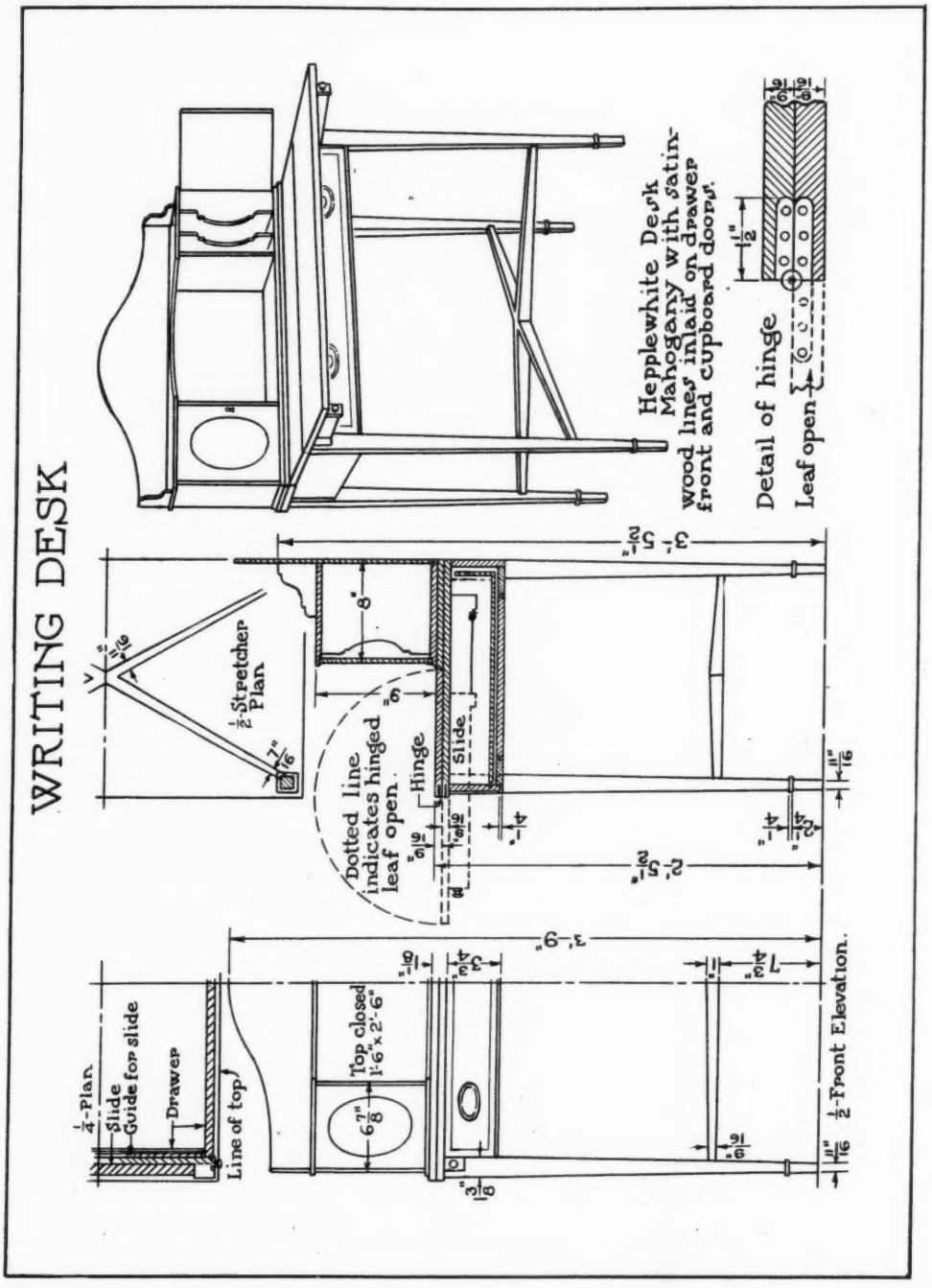
HEPPLEWHITE'S BOOK OF DESIGNS "THE CABINET MAKER AND UPHOLSTER'S GUIDE" WAS PUBLISHED IN 1788, 1789 AND 1794

HEPPLEWHITE FURNITURE

PLATE OF TYPICAL HEPPLEWHITE PIECES.

The furniture of this time was very beautiful. Bookcases showing the influences of Robert Adam were constructed with a brass trellis in the panel doors in place of glass. Carved details such as festoons, vases and griffins were used for ornamentation. Carved mouldings, dentils and pearl beading were employed on the cornices. Flat veneer was introduced on glass bookcase and china-cabinet doors. The tracery was cemented to the glass and resulted in very poor construction A typical Hepplewhite detail is the hollowed-out bracket plinth or French foot.

China cabinets with similar details were made. Sunken pilasters with patera and pendant husks were used at the sides. There was often a fluted frieze separating the upper and lower sections, and lattice work pattern was shown on the doors.

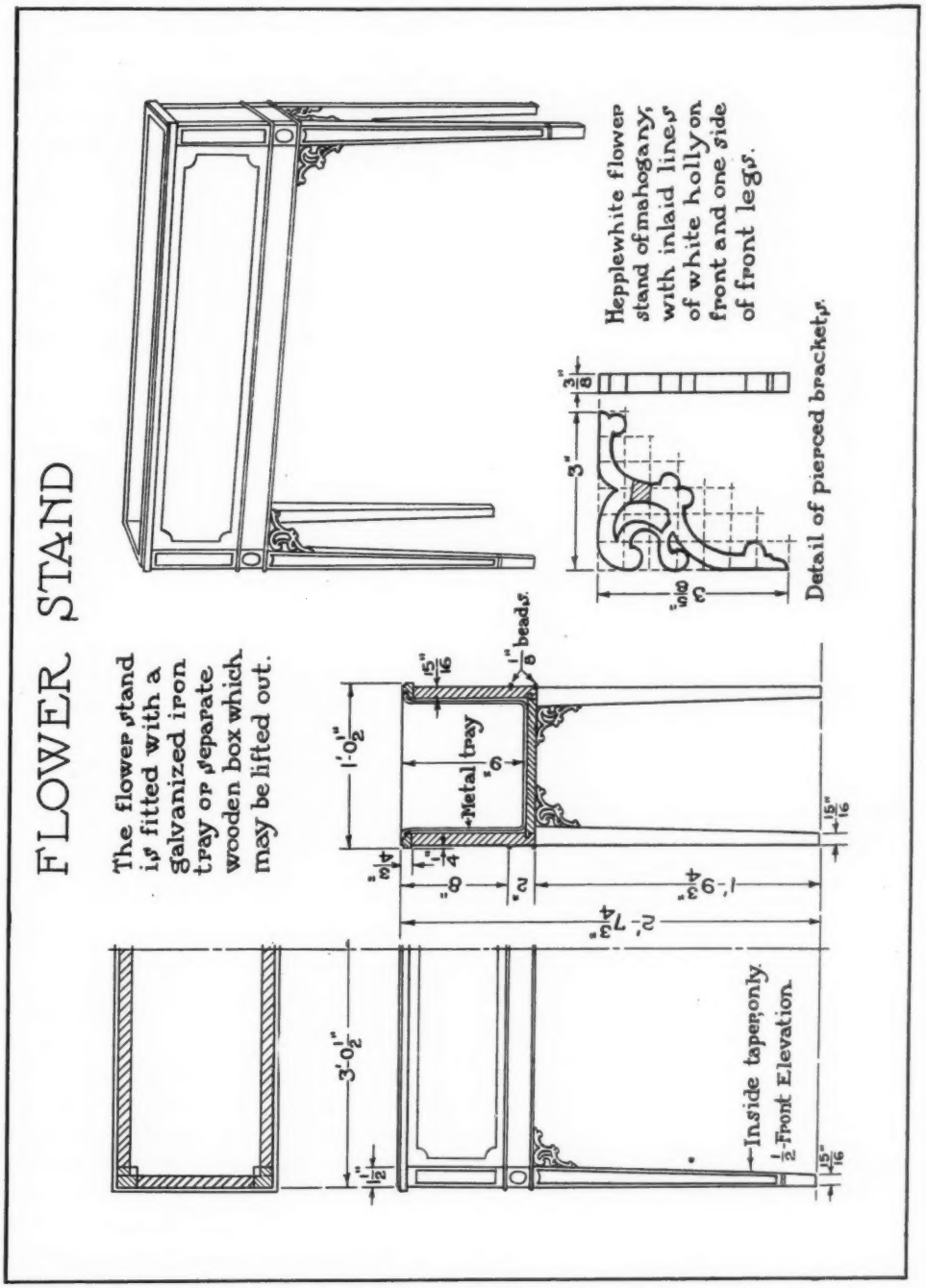


The Tall Boy Chest of Drawers was a dignified piece of furniture with many of the same details. Beaded drawers and cross-banding were employed as well as inlay and colored marquetry, stopped flutes and carved flowers. Some chests were constructed with ser-

pentine fronts and were veneered with carefully selected woods.

A popular type of wardrobe used the serpentine shaped front and had a carved frieze displaying the "Prince of Wales' feathers." This was a popular motif of the Hepplewhite firm and was used extensively.

which, when pulled forward and the front dropped down, formed a writing bed. The inside was fitted with small drawers and pigeon holes, which had cut-out bracket pieces at the top. An inlaid herring-bone line, or satinwood banded with rosewood, was often used on the drawer fronts. The legs were tapered on the inside


FLOWER STAND
The flower stand is fitted with a galvanized iron tray or separate wooden box which may be lifted out.
Hepplewhite flower stand of mahogany, with inlaid lines of white holly on front and one side of front legs.
Detail of pierced brackets.
Metal tray
Inside taper only.
Front Elevation.

Secretary cabinets of this time were very interesting and showed the later influence of the Adam style. Painting was substituted for inlay in many instances to represent fluting and flower ornaments. The writing section of these cabinets was generally a deep drawer

edge only. This feature was characteristic of Hepplewhite and was employed extensively on small cabinets and stands. The inside taper gave the appearance of a slight outward splay which was very pleasing. A light

cross stretcher having the upper side tapered was often used.

Writing tables with tambour tops were in use. The tambour was formed of moulded beads which were glued to a canvas backing and worked similar to the modern roll-top desk. The inside was fitted similar to the secretary cabinets and the writing bed was sometimes lined with leather.

Side tables with curved fronts and tapering legs were decorated in many ways with painted ornament and with colored woods such as kingwood, rosewood and holly.

Hepplewhite settees and sofas were comfortable pieces of furniture with shaped backs and "roll-over" arms. The seat rail was usually shaped and ornamented with flower forms. Cane was also used in the seats and backs. Legs were of different type, square and tapering, others turned and reeded. They were generally finished with a spade foot.

The corner-cabinets was a favorite piece of furniture. The interior was usually painted some light color and the front edges of the shelves were lined with gold and shaped.

Sideboards of the pedestal type were made by Hepplewhite. These were quite similar to those of the Adam style but differed in details and ornamentation.

Chairs were Hepplewhite's most original creations. The shield back was a favorite form, and usually it had a small beading on the inside and outside edges of the back. The shield baluster back had from two to five carved balusters and the top rail of the back was shaped in different ways with a small flat curve known as a bow top and also with a serpentine curve.

Some of the early shield back splatted chairs had stretchers and arms that swept from the back down to the front legs, but later models had the arms set back slightly and fastened to the side rails. Drapery swags were sometimes suspended from the center to the corners of the top back rail.

Another type of Hepplewhite chair was the splat back instead of the baluster. The splat back had many variations. Some splats were ornamented with carved boxwood which was applied and some were painted.

The interlaced-heart-and-hoop back was another favorite design. It was ornamented with beading, carved wheat ears and pierced splats with arch-shaped openings. "The Prince of Wales' feathers" was also used as a motif for chair-back designs.

The oval back was the next development. In this type the backs were quite flat and were pierced and ornamented.

In the English division of Hepplewhite's work the furniture was very similar to that of Sheraton and there are many pieces which are difficult to assign to either designer.

The French work displayed many French motives combined with characteristic Hepplewhite features. About 1765 French fashions became popular in England and furniture was designed to go with the new style. Many beautiful pieces were constructed by Hepplewhite. Mahogany was not used so much as previously, and the use of gilding, painting and flower decorations was increased. Floral marquetry in various colors was also popular.

Turned legs were used more on sofas and with many variations of French backs. Chairs were often painted cream or white and had the ornament picked out in gold.

Note—Photographs 1. 2. 3. and 4 are shown by courtesy of The Metropolitan Museum of Art, New York. Fig. 5 is shown by courtesy of the Museum of the School of Industrial Art, Philadelphia, Pa.

The Human Relation in Shopwork

Raymond L. Harrington, Supervisor of Manual Training, Natick, Mass.

WE are hearing more and more each day concerning human relations in industry. Employers everywhere are awakening to the realization that their employees' welfare, state of mind, and occupational fitness is reflected very vividly in production and overhead expense. In factories and business houses where the employee has been given a chance to cooperate with his employer, not as an automatic machine, but as an interested, appreciated, thinking human being, the results have been worth the effort in all cases.

As instructors and supervisors of shop-work we have many problems to solve, which are as important to us as are the problems of the employer to him. We must keep our boys interested, win their respect, be assured of their sincere cooperation, and have them feel that they are getting a square deal. Such problems as these should be the subject of much serious thought on the part of every conscientious instructor.

The following plans for aiding in the solution of some of our problems have been tried out in the writer's classes; these together with the results obtained are passed on to those who perhaps are still turning out projects instead of boys.

In Shop Government.

At the beginning of the school year each new class is given a voice in making its own shop rules. The instructor, acting as chairman, begins the discussion by asking why rules are needed. The answer invariably given is, "So we may know what we can do and what we can't." This answer, given by one of their own

number, places the class in the proper mental attitude which results later in a selection of the very rules the instructor himself would have formulated.

As beginning classes are unfamiliar with shop-work, it is necessary for the instructor to state very briefly the various subjects upon which some definite rule must be made, such as the following: 1. How shall we enter the shop? 2. What bench shall be used? 3. Care of tools on bench. 4. Care of general tools. 5. Leaving benches. 6. Conversation. 7. Wasting materials, etc. Subject 1 is then discussed, a motion made, seconded, and put to a vote. The other subjects are then disposed of in a similar manner. The discussions, very neutral at first, usually develop into heated arguments before half of the rules are made.

The following list of rules adopted by one seventh grade class is almost identical in content with that of the remaining five included in the experiment.

1. Walk in quietly and go to bench.
2. Each pupil will be assigned a regular bench.
3. Keep all bench tools in their proper places when not in use. Report missing or broken tools to the instructor.
4. Return all general tools to the tool-room.
5. Pupils may leave benches to get tools or materials without asking permission.
6. Conversation may be carried on quietly between the pupils concerning their work.
7. All lumber, sandpaper, nails, screws, etc., not used should be returned to the scrap-shelf or tool-room.
8. Leave benches clean and orderly at end of period.
9. Pass out quietly, one row at a time, when dismissal signal is given.

The shop rules given above differ very little from the various rules announced by the average instructor at the beginning of each year. Yet how many of the pupils actually remember each rule without being continually reminded by the instructor? The very fact that each pupil has discussed the several motions and voted upon them gives him an entirely different attitude toward discipline, and impresses each rule more deeply upon his mind.

In Choice of Projects.

Three years ago the author spent his summer vacation making tracings and blueprints of a course to be used in his present position. The course was outlined on the group method. Each pupil was obliged to choose and complete one project in each group. The course consisted of eight groups, with from four to ten projects under each group. This plan worked out very well with the seventh grade classes, but did not hold the interest of the eighth grades.

The following year this course was discarded in the eighth grades, and pupils were allowed to choose their own projects and bring in their own ideas. This method proved to be more successful than that of the preceding year, but there were still the few who could not find anything to make.

The next year a list of the most popular projects made in previous years' eighth grades was sent to each school. Eighth grade pupils were requested to copy the list of suggestions and choose some project from that list, or bring in an original idea. The requirements governing this choice were: (1) that the project be within pupil's ability; (2) that the project be needed in pupil's home, school, play, or community; (3) that a rough freehand dimensioned sketch be shown to the instructor for his approval.

It might be well to state here that a very small percentage of the pupils, in making their choice, overestimated their ability.

The classes in which these experiments were conducted varied in size from fifteen to twenty pupils.

The adoption of this plan means hard work for the instructor, but the reward one will receive by the added interest and enthusiasm shown is well worth the effort. It is true that the instructor will be obliged to do more individual work with each pupil, but after all, should not this be the keynote of all successful instruction?

First Aid to the Handicapped.

Each class has its quota of handicapped pupils, who, if not given a proper chance, will remain a constant source of trouble to the instructor throughout the year.

Each one of these socalled trouble makers is handicapped in some manner which impedes his progress in shop-work. It is for us to find out just what that handicap is, and either use it to good advantage or try our best to eliminate it.

Continuous trouble with any one pupil should indicate to us that something is radically wrong somewhere. It may be his home life, the course may be at fault, or perhaps the boy is not thoroughly understood. Discover the cause of the handicap, if possible, then rehabilitate.

For illustration the author cites two cases investigated in his own classes, which may in many instances cover two general types of handicapped pupils.

"A" gave the instructor a great deal of trouble during the first half of his seventh year. He did well in mechanical drawing and showed some marked ability in woodworking at the beginning. Gradually his interest faded, then "A" began to disturb his neighbors when the instructor was busy in another part of the room. He would never voluntarily choose any one project from a group, nothing seemed to appeal to him. If the instructor did succeed in coercing "A" into making some project, it would never be taken home, and he showed no interest in the job. "A" was handicapped; he could do good work, the skill was there, but the interest was lacking.

Upon investigation the instructor discovered that "A's" parents showed no interest in his shop-work, nor encouraged him to make things for the home. After a long talk with "A," he told the instructor that he would much rather do repair work around the shop than perform the classwork. He was given a trial. Today "A" spends his shop period repairing benches, school furniture, etc., or being sent out on a repair job to one of the schools. He delights in the work, and it is believed that "A's" handicap was utilized to the satisfaction of all concerned.

"B" was another seventh grade pupil, poor in scholarship and an inveterate cigarette smoker. His principal had tried for a year to stop the habit, but with no apparent results. To all appearances "B" was extremely lazy, he would not work if he could find a way out of it. He was easily discouraged in woodworking and his projects were always failures. Several times "B" left the shop, during the period, without permission. On each occasion he was punished by his principal, but to no avail. The last time "B" left the class without permission, the instructor determined to find out, if possible, just what was wrong. An interview was arranged between "B" and the shop instructor, during which the following facts came out. His home life was anything but pleasant. He admitted that he smoked cigarettes incessantly. When asked why he left school without permission, he told of his genuine dislike for woodworking. Further conversation brought out the fact that he did like mechanical drawing. The instructor then agreed to let "B" spend his whole period each week in mechanical drawing, and to furnish lessons and material for home work, on condition that "B" agree to make an honest effort to stop smoking. "B" agreed, they both shook hands, thus binding the agreement. "B" made good. He has made rapid strides in mechanical drawing, improved in scholarship, and has not smoked for a year.

The author does not profess to have worked out a new method of attack, or that his troubles have all been eliminated. There are many other teachers, no doubt, who are utilizing the human elements in their shop-work, and are using these same methods. It is hoped, however, that an account of these plans will stimulate more thought, action, reports on other experiments, and correspondence on the subject.

Cabinet Work at the Manual Training High School, Peoria, Ill.

S. J. Cullings

THE idea of keeping abreast of the times and styles in manual training furniture is not a new one by any means. What we are trying to do at the Peoria Manual Training High School is to create an interest among the boys for well-designed and well-constructed furniture of modern style.

At the present time the "period styles" of furniture are quite universally accepted as the best and most popular. Hence our efforts have been to encourage the designing of furniture which has a close similarity to that of some "period."

Mr. J. R. Vertrees of the drawing department has secured a number of very good furniture catalogues, and by means of these and newspaper cuts, has been able to create a great deal of interest in, and appreciation for, the best designs in furniture.

First the folks at home are consulted as to what is needed or most desired in the furniture line. If the boy's ability is equal to the project chosen, then the catalogue is consulted, or better still, a trip is made through a furniture store to get general ideas.

Details in construction and design are first sketched out, then drawn out carefully to scale, traced and blueprinted. Before the drawing is made an approximate estimate of the cost is determined, so that a project will not be started that cannot be paid for by the student.

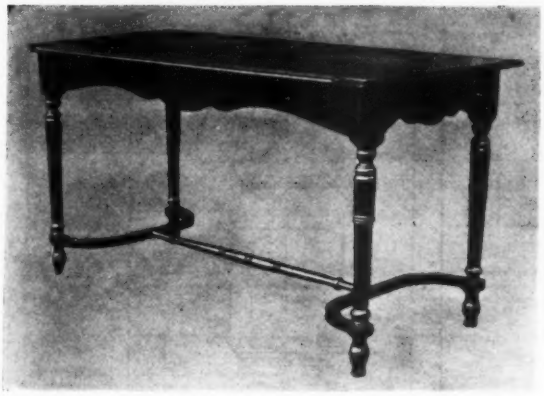
Beginning with the freshmen, projects involving a combination of turned and flat are encouraged. If the boys wish to make a foot-stool, he is told to look at some designs where the legs are turned and perhaps the seat has a cane bottom or is upholstered in tapestry. In nine cases out of ten he will choose the stool with the turned legs in preference to one that has square legs.

This has a tendency for putting the beginners in a better frame of mind for furniture design in their second year. They are more discriminate in their choice, not being satisfied with just a library table, but it must be up-to-date and be called a davenport or end table, but it must be just as good or better than those up town in the display windows.

Since we are doing so much extra wood turning in the lathe room, we feel that there is additional justification in teaching wood turning. Fully 75 per cent of the cabinet making classes are using turned parts in their projects. Every hour of the day, cabinet makers are working along with the regular wood turners.

We were fortunate this year in getting several thousand feet of well seasoned walnut, which turned well and takes a good finish. In most cases, such as a floor lamp, where all is turned work, a shellac and oil finish is used. If put on correctly this finish is cheaper and better than varnish, especially where there is no dust-proof finishing room.

Among the projects that have been completed this year, are davenport, console and dressing tables, cedar chests with turned trimmings on the corners, vanity



LIBRARY TABLE DESIGNED AND MADE BY STUDENT.

LIBRARY TABLE DESIGNED AND MADE BY A STUDENT.

dresser, spinet desk, floor lamps, stands, music cabinet, smoking cabinet, cabinols, and numerous small projects.

Under the direction of Mr. C. M. Cain, in the cabinet shop, these projects have been successfully turned out with but very little deviation from the blue-prints made in the drawing room. The accompanying drawing will give the reader a fairly clear idea of the projects.

It is *interest* that makes the whole thing a success, not only the boys' interest, but the interest of his mother or sister at home, who has long coveted a dressing table with "French legs and three mirrors" or a console table with "turned legs and a fancy top." With this kind of interest spurring him on it is small wonder that he puts into his project all his available time and ability.

Davenport Tables.

These tables do not represent any particular period in design. The design of the turned parts are original with the sophomore boys who built them.

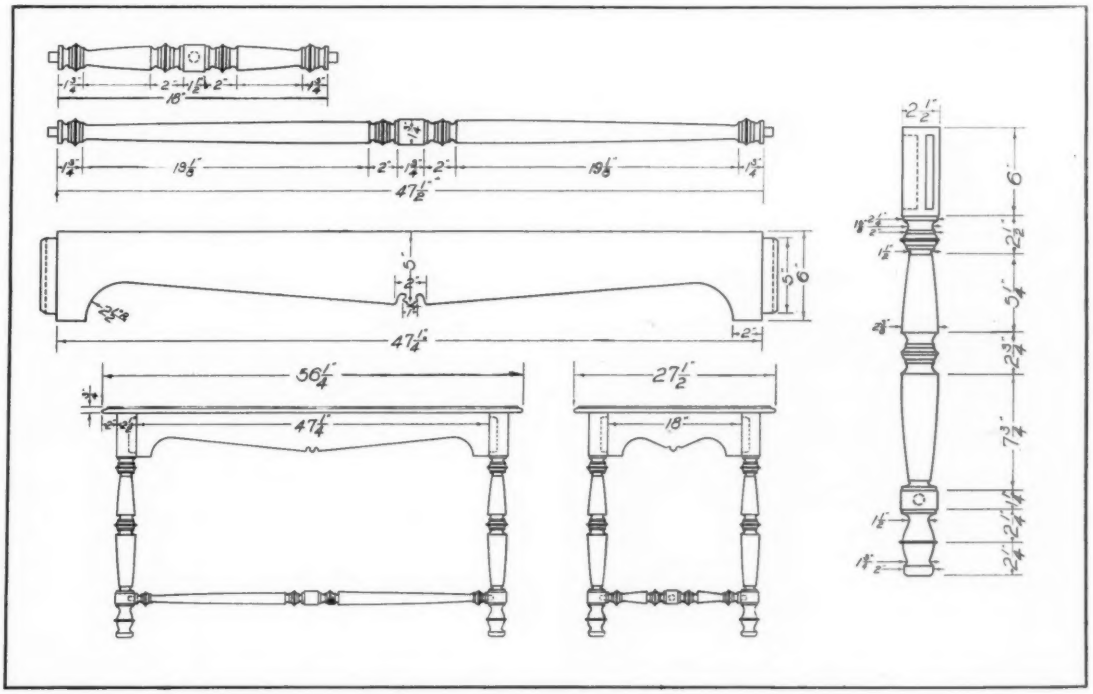
Both tables have about the same general dimensions, the main difference being in the legs and stretchers. The long stretcher was turned in two sections to avoid vibrations. The two sections were tenoned into the square section in the center and glued. The curved stretcher was much more difficult to make and fit. The curved sections were built up with the grains crossed to insure strength.

The turned parts can be pumice stoned in the lathe to take out all sand-paper scratches.

A simple edge done on the shaper adds a great deal to the top and produces a pleasing effect.

Console Tables.

The design of this table was made to closely resemble that of Louis XVI. American walnut, of which



DETAILS FOR LIBRARY TABLE.

CONSOLE TABLE. (SEE DRAWINGS.)

the table was made, will probably give better satisfaction than any other wood.

The legs are turned from square stock (2x2) with the enlarged part near the top built up to allow the right diameter when turned.

The curved end rails should be built up out of bass wood and cut from a template to the right curve. A form was cut to fit around the rail to enable veneering and this form was kept and used in glueing up the table.

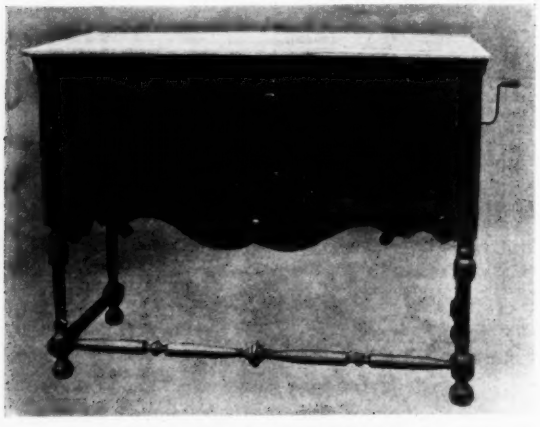
The stretcher at the bottom can be fastened together with a coped dowel joint, which is probably more satisfactory than a miter. The shaping of the stretcher was done on the circular saw.

It is almost necessary to mill the edge of the top in order to produce the right effect and harmonize with the rest of the table.

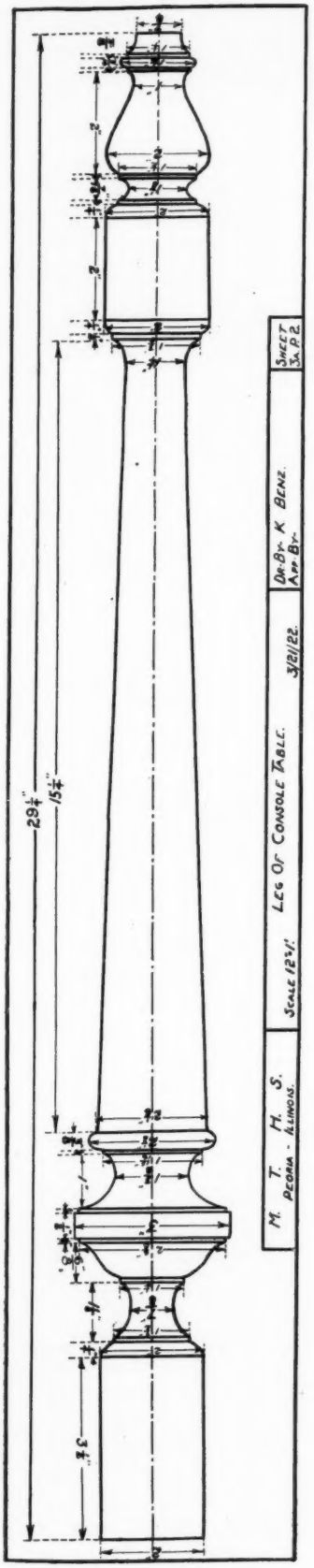
The finish consisted of coats of linseed oil, shellac, and varnish, rubbed down with pumice stone.

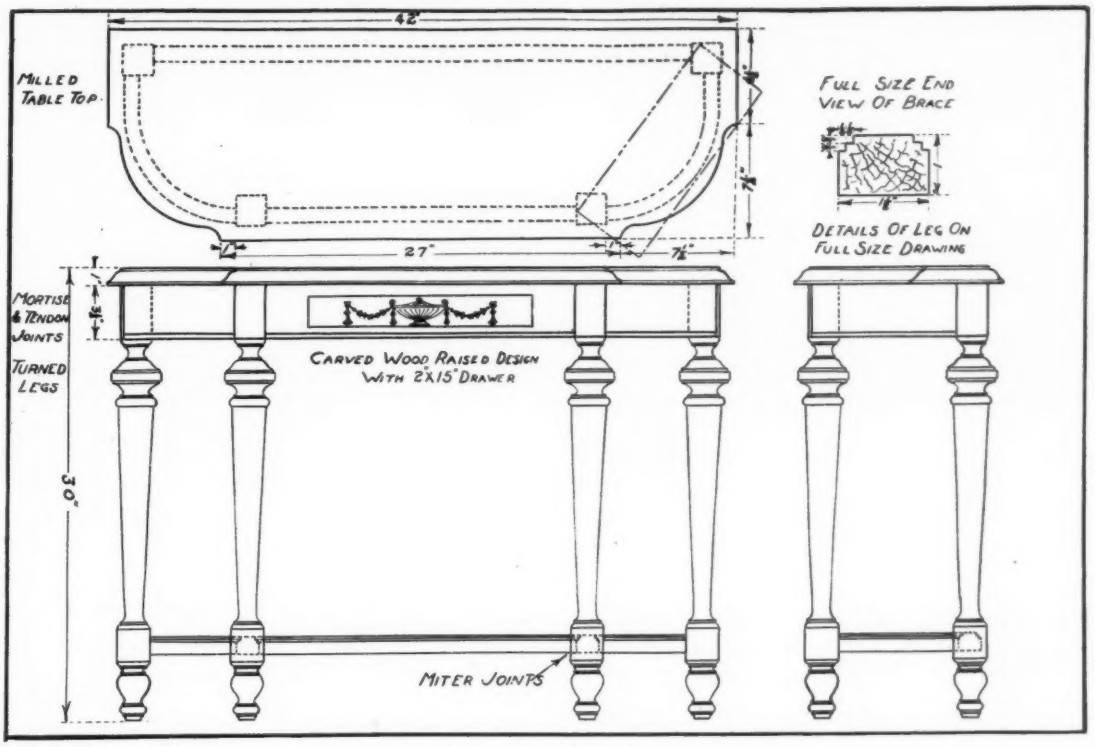
Phonograph.

This phonograph was designed and built by a senior boy in advanced cabinet making. The type of design, while not a true one, is suggestive of the Italian Renaissance.



CABINA-PHONE. (SEE DRAWING.)





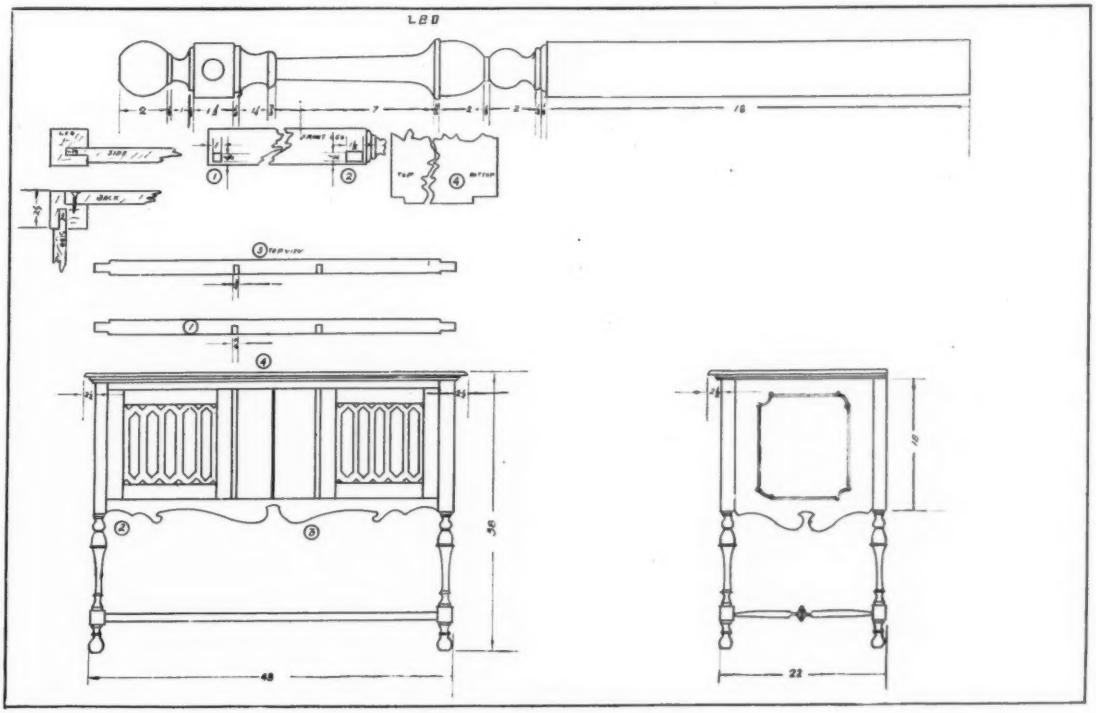
DETAILS OF CONSOLE TABLE.

American walnut was used throughout except in the back, which is 3/8" bass wood stained dark.

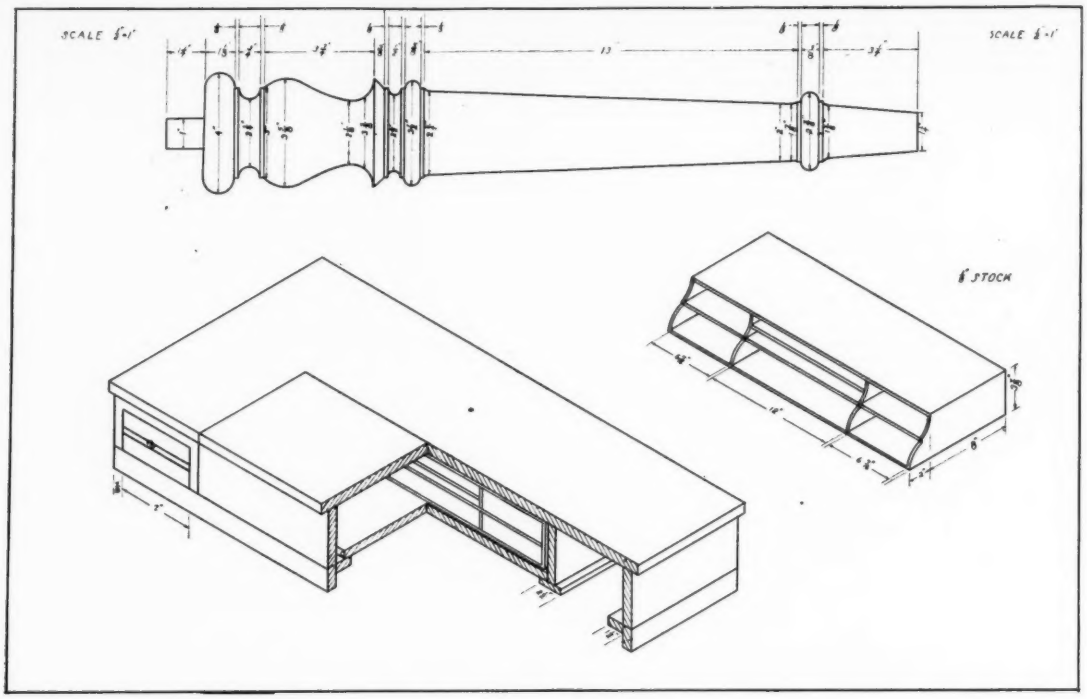
The grill work on the two doors was cut out in sections on the hand saw, cleaned up, and set into the door frame which was made like a panel door.

The throat, which conveys the sound from the machine to the horn, can be made out of two pieces of two-inch white pine. Half of the opening is gouged out of each piece, the surface sanded perfectly smooth, shellaced and varnished to a fine finish. The two halves are then glued together.

The horn, which is in the compartment directly



DETAILS FOR CABINA PHONE.



DETAILS FOR SPINET DESK.

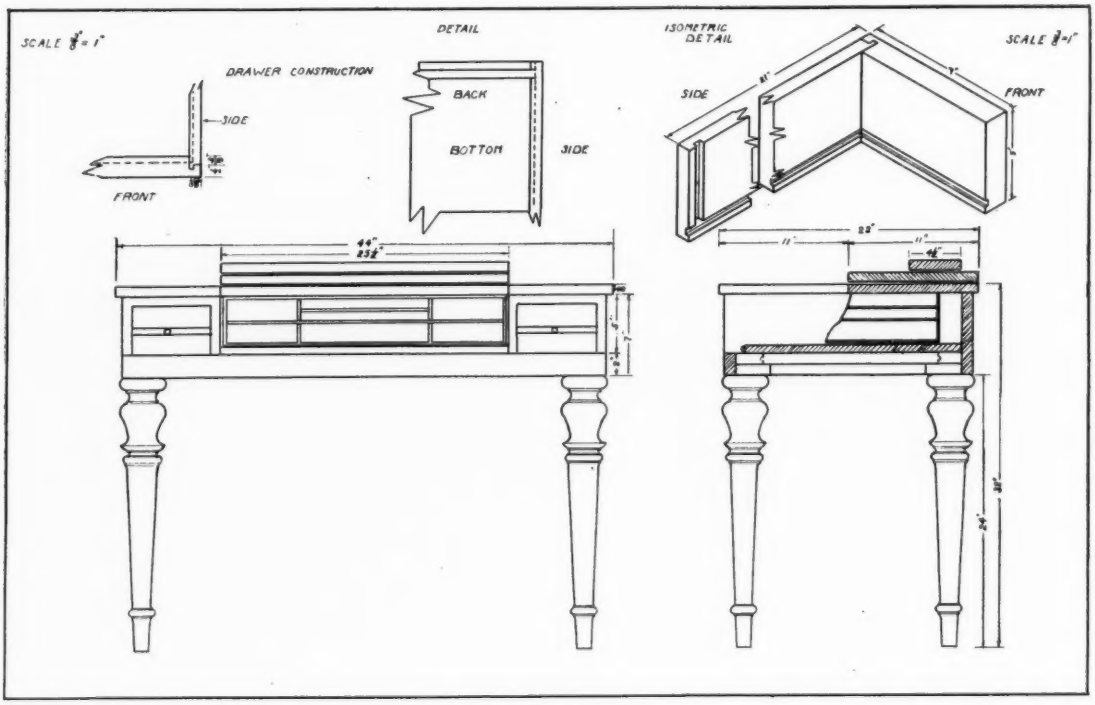
below the motor, was made hopper shaped out of 3/8" walnut.

The corners of the horn were butted, glued, and fastened with small screws.

The inside corners should be filleted with large leather fillet, as sharp corners are an impediment to sound. All parts of the cabinet, especially around the motor, should be securely fastened and solid, to prevent vibration.

The mechanical part was purchased complete from a firm in Elkhart, Indiana, at a reasonable price. The cost of the entire phonograph will be around fifty dollars.

The right and middle compartments are for records. The right section has drawers that pull out and the middle section is fitted with shelves.



DETAILS FOR SPINET DESK.

Mechanical Drawing for High Schools

—Graphical Thought

Carl L. Svensen, M. E., Assistant Professor of Engineering Drawing, Ohio State University, Columbus, Ohio

THOUGHT affects our physical life, our mental life and our religious life. In general terms, then, education may be considered as the development of the power of thought.

For purposes of orienting the subject of mechanical drawing, thought may be arranged roughly in three divisions as:

Literary thought,
Scientific and mathematical thought,
Graphical thought.

A truly educated man should be able to carry on his intellectual research in all of these divisions, choosing the one best suited to his immediate needs. Without a proper development of all, one must resort to makeshift methods of thought with the attendant excess of labor.

With a realization of the position which graphics occupies as one of the languages of thought, one may expect mechanical drawing to be recognized as an equal among literary and mathematical studies. In discussing drawing and constructive work, Nicholas Murray Butler says, "It aims to develop in the pupil powers of thought expression that no other study reaches, as well as to train the judgment, to call out the executive powers, and to give confidence in dealing with actual material."

Mechanical drawing or graphics develops the power of space thinking—the power of visualization. The present is an engineering age and engineering development requires applied space thinking. Such thinking is made practically applicable when put into the form of drawings. The important idea in a course in mechanical drawing is the development of the ability to think in space—three dimensional thinking. Other topics which form a part of the subject are exactness, neatness, sense of form, sense of proportion, etc.

The factors which must be considered are the student, the teacher, the subject, and the course.

The student's interest must be maintained and stimulated, his power of thought must be developed and his knowledge of the subject augmented. All this must take place in a natural and logical manner.

The teacher needs little discussion, for most teachers realize that the responsibility for success is their own. The qualifications of the teacher of mechanical drawing are pretty well understood. They are a knowledge of the subject, its relation to other subjects, its use in the industries, its educational possibilities, together with patience, the ability to analyze the student's difficulties, and above all, a well-founded, broad educational viewpoint.

The subject-matter and the course may be considered by discussing some questions which often arise.

1. *How many hours per week should be devoted to the subject of mechanical drawing?*

A minimum would seem to be three periods of 90 to 120 minutes each. Five such periods would be desirable to maintain continuity and to assure time enough for the completion of work.

2. *What topics, or parts of the subject, should be covered in a complete course?*

There are two grand divisions of the subject of mechanical drawing as taught in the high schools. These are *shape description* and *size definition.*

The topics or subdivisions under each of these headings is subject to considerable variation in content, in order of presentation, and in methods of presentation. They may be listed as follows:

A study of instruments, materials, etc.
Orthographic projection with its usual divisions:
- Regular views,
- Auxiliary views,
- Sections,
- Revolutions.

Pictorial drawing with its divisions:
- Perspective,
- Isometric,
- Oblique, etc.
- Developments and intersections,
- Freehand lettering,
- Freehand sketching.

In addition there are advanced courses in:
- Machine drawing,
- Sheet metal drafting,
- Architectural drafting,
- Curve plotting and the use of graphs.

It is not my purpose to criticize unkindly but to suggest an answer to the question which we all ask ourselves. How well am I succeeding in the work which I am doing? Where should the emphasis be put? Some topics which might be mentioned for consideration are, first, the proper adjustment, care and handling of tools. Such instruction is always given. But do you follow it up? Do you observe closely to see that each student practices what you preach? An occasional demonstration of the uses of the tools, by a student, is well worth the time. There should be one or two "inspections" of the equipment during each term, with a definite grade assigned. Few students appreciate the necessity for proper adjustment of tools and the value of a sharp

pencil point as a means of acquiring accuracy and speed.

A thorough knowledge of the use of the scale, both full size and the proportional scales, is important. Individual tests are necessary to insure a proper understanding by the student. The use of the scale in laying out as well as in measuring is an important part of this work.

The conception of drawing as a language can be brought out more clearly and some of the fundamental laws of projection explained. The ability to think in three dimensions and to visualize both shape and size can be developed in a high school course in mechanical drawing.

TRANSLATION from views to a MIND PICTURE of the SHAPE of the object should be tested again and again.

TRANSLATION from scale drawings to a mind picture of the SIZE of the object should be carefully tested.

3. *What influence should college courses exert upon the subject in high schools? Should different courses be taught those who are preparing for college?*

There seems to be a handicap placed upon the work of the high schools by reason of the consideration given to "college entrance requirements." The high school is not a part of the college and except in certain private institutions is not directly controlled by a college, nor does it expect all its students to enter college. Something like 85 per cent of the high school students do not go to college. The special field of the high school is to train for citizenship. This task is certainly too important to be set aside for the needs of the fifteen per cent of the students who are fortunate enough to go on to a higher education.

A course of ample scope and well taught is the best preparation for citizenship. Upon this let the college build. Let us make each part of the course of value in itself but do not separate the students into groups nor lessen the value of the high school to those who are there finishing their education.

4. *What is the best method of teaching mechanical drawing?*

The best method of teaching any subject depends largely upon the teacher. The answers to this question will be somewhat general.

For teaching mechanical drawing we have to consider:

Purpose of the course in mechanical drawing,
System for economical use of time,
Selection and arrangement of subject-matter.
More in detail we have:
Laboratory methods,
Recitations,
Home study sheets,
Examinations and questions,
Use of textbooks,
Lectures,
Notes and references.

Laboratory work is effective in teaching drawing. It ought to be closely supervised. There are limitations as to the scope of the work, as the number of drawings which can be made is not large. The reading of drawings requires the making of them. It is necessary, however, to be sure that we are teaching drawing and not simply teaching the student to draw. There is a certain hurry or anxiety to make drawings, to get the views completed which sometimes leads to neglect of the opportunity presented to develop the power of accurate thinking and of accurate visualization. It is not a question of how many drawings or of how large and how complex, but of how well done and how well understood.

Carefully conducted recitations serve to enlarge the field covered in a given course and to make it more useful educationally and practically. Discussion will clear up indefinite ideas and extend the application of what has been learned in making the laboratory sheets. Definite assignments in a textbook for regular recitations make for a quicker understanding and for better work in the laboratory. Professor Parker of Chicago states, "The use of books is a most important process in social life, and it is the most economical means of giving instruction in school."

Lectures are useful but should not be too frequent or too long. Nor should they be used as the sole means of instruction. The average student will learn more quickly by study and application than by listening to a lecture. Demonstrations of short duration and immediate application are valuable and especially when followed by study and recitation.

Notes serve to extend the usefulness of the textbook by giving additional instruction or presenting special problems. References are valuable when made easily available and when definite pages are assigned.

5. *How can the efficiency of attainment of students be assured and tested?*

By recitation and examination. Students can often make drawings when aided by models and partial views for rather complex devices, but are unable to read the same type of drawing unaided. Pictorial sketches, either perspective or isometric, serve as a very useful means of testing the student's power of visualization. The student's descriptive power is increased when he has to describe methods and principles in words as well as by drawings.

Tests serve to bring out the points which are not understood, to indicate the degree of confidence possessed by the student, and to show his speed in thinking and working. Short tests given rather frequently seem to be more satisfactory than one or two long examinations.

Examination questions should be designed to bring out the desired information with the least amount of drawing. They should be very definite as to requirements not involved or catchy, and should be designed so that the solution and answer can be easily seen and checked.

Checking or grading drawings is an important means of following up the work. Every drawing should be checked and graded. This should be done and the work returned to the student for necessary alterations and corrections as soon after its completion as possible. The student should have the benefit of criticisms to aid him in succeeding sheets. A definite grade should be given and the student should be informed of the basis for that grade. In general, the items for consideration in grading a drawing are:

Correctness,
Accuracy,
Quality of line work, etc.,
Lettering, titles, etc.,
Dimensioning,
Neatness,
Time required.

The valuation to be placed on each division is subject to variation with the nature of the assignment. When grading the first few sheets each item should be further subdivided.

A credit slip which can be attached to the student's drawing is a convenient method of insuring careful attention to grading by the teacher and informs the student of just where his work is defective.

A careful record should be kept of the grades in such form that the student's standing can be observed at any time. Graphical methods lend themselves to this purpose.

6. *Can drawing be correlated with other studies?*

Illustration and graphic analysis are so widely applicable to the study of almost any department of knowledge that the possibilities of correlation of drawing with other subjects are numerous. While drawing is the language of engineering and has a great value in this one use, it must not be thought of as less important educationally than the acquisitions of knowledge or the accomplishments which it makes possible.

The most usual correlation is that of drawing and shop-work. Drawings made for or in the shops should be required to attain the same standards of neatness, accuracy and completeness as those made in the drawing room. To this end the drawing and shop-work teachers should work together.

Other studies which readily lend themselves to correlation with drawing are art, physics and the natural sciences, mathematics, English, and the commercial courses.

The use of sketches and drawings as a part of other courses greatly increases the interest of the student and helps him to a better understanding of all his studies. The English used on drawings in the form of notes and specifications of graphical methods, composition of titles, meanings of words and phrases, names of parts and processes—all these should receive attention from the department of English.

Geometrical solutions, curve plotting, etc., should be analyzed and studied from both the mathematical and graphical viewpoints.

A certain amount of drawing should be a part of every commercial course. In business, the drawing and interpretation of graphs is essential and the schools should recognize its importance. Ordinary charts and pictorial methods are necessary for accurate comparison of quantities. W. C. Brinton, author of "Graphic Methods of Presenting Facts," says, "When graphic methods are more widely used for portraying quantitative facts, there will be a tremendous gain to accuracy of thought as well as a great saving of that most valuable thing in the world—time."

Not only interest but a quicker understanding and a keener intellect are served by the correlation of studies. Drawing should be thought of in much the same light as English, important in itself, but necessary for the study and understanding of all other branches of knowledge.

Finally, let me emphasize the place of mechanical drawing in the high school. There are those who have emphasized the practical value of studies and who would consider first the "dollar value" of a subject. The value of mechanical drawing as applied to the industries is so evident that its other values have often been neglected by the "dollar educator." The fact that drawing is useful does not make it any less valuable as an educational subject. Its greatest value comes from the language training, from the mental discipline of a language which develops the ability to imagine definitely, to visualize clearly and to think accurately. It is what takes place in the brain rather than the drawing of lines on paper which gives mechanical drawing its greatest permanent value.

True industrial education will not—need not—sacrifice sound education to immediate training for providing for physical needs. There are other needs which must be provided for. Mechanical drawing and other useful subjects can serve a double purpose. Do not consider these subjects solely with the idea of their application in the industries.

Let me quote, in closing, from an address by Dr. Charles W. Parmenter of the Boston Mechanics Arts High School when he discussed the menace of an early choice of vocation:

"The high school of the future will not be guided by the false philosophy that enthrones utility and destroys idealism, but by idealizing the educational

agencies that touch the daily life of the great masses of men, it will give to struggling humanity new joy and new vision.

"It will rightly regard as a menace to democracy the educational philosophy that encourages early choice of vocation and furnishes narrow and special training that has little transferable value when improved economic conditions, aroused ambitions, or a new outlook make a change of occupation desirable. All education should be conceived and formulated not in terms of industrial or economic autocracy but in terms of steadily advancing democracy."

Can College Women Measure up with Professional Cooks?

Miss Ava B. Milam, Dean, School of Economics, Oregon Agricultural College, Corvallis, Oregon

DO YOU think your college girls can compete with experienced hotel chefs?" and "Aren't you somewhat ambitious?" were typical questions hurled at the School of Home Economics of the Oregon State Agricultural College when it decided to accept the invitation of the Multnomah Hotel manager to bring 35 home economics senior women to Portland and cook, and serve dinner to the public in the Gold Room of Portland's largest hotel.

The more dubious the inquiries seemed the more convinced were these college women and the home economics teachers that this invitation must be considered as a challenge, and the doubting public must be convinced that college women can measure up. So in the spirit of "we'll show what college women can do" 35 home economics women of the college boarded the train for Portland, Oregon, on the afternoon of May 4.

The morning of the 5th was spent in satisfying moving picture concerns and photographers of the press, for the announcement had appeared in the papers that this unusual project would be undertaken by these young women, and the public and the press had already manifested much interest. At one o'clock eight of these young women who had had one or more courses in institutional management in the college, donned their white uniforms and went on duty in the kitchen, and four others in the pantry to prepare the following dinner menu made out by the hotel management:

MENU

Ripe Olives — Green Olives — Salted Nuts
Canape Multnomah

Merry Widow Cocktail

Cream of Asparagus Soup

Tenderloin of Sole, Tartar Sauce

Roast Chicken, Special Dressing
Fresh Asparagus — New Potatoes

Lettuce and Tomato Salad
French Dressing

O. A. C. Parfait
Kisses — Macaroons

Coffee

The chef remained in the kitchen to answer questions or make suggestions when needed.

Through the entire afternoon interested people came through the kitchen to observe, and newspaper reporters and photographers appeared to take more pictures. At 5:30 o'clock the dining room, all decorated in orange and black, the college colors, was opened and the 23 young women in their simple white uniforms, low flat-heeled white shoes, were ready to serve the public. During their breakfast and luncheon they had observed the hotel service, so they were prepared by this time for their three-hour demonstration. At six o'clock the dining room was filled with interested people, newspaper men and women, representatives of the women's business clubs, Associated Press reporters, etc.

So successful was this experiment that the hotel management has requested that it be made an annual affair and that the invitation for next year include the buying, the planning, the cooking and the serving of a luncheon in the Gold Room, and a dinner in the Arcadian Gardens where a larger number of guests can be accommodated, and a greater per cent of the ninety home economics senior women of the college can be given this experience, which from the point of view of the young women who have had it, is invaluable.

"That is the best meal I have had in the hotel in the three years I have lived here, and if there is anyone who doesn't like that dinner he should go hungry!" were typical remarks overheard in the lobby after the dinner was served.

The press gave much space to the report of this experiment. Some of the reporters who came to interview the chef and the college women did not hesitate to say that they really expected the chef to do the cooking and the girls to receive the credit for it, but after plying many questions, and observing they went away convinced that it was really not a farce and the young women were doing all for which they were receiving credit. Some pictures and very splendid articles came out on the front pages and prominent places in all of the Portland papers. Excellent editorials were written, and much to the surprise of all, these women "broke twice into the Associated Press."

Such publicity! And as a result, upon their return to their college they were greeted almost as cordially as the football heroes upon their return from winning

THIRTY-FIVE HOME ECONOMICS STUDENTS OF THE OREGON AGRICULTURAL COLLEGE, CORVALLIS, ORE.

a victory, for had not these home economics women reflected almost as much credit upon their institution as the successful athletes of the past season?

"Did the girls enjoy this experience?" is a question which one who had had the opportunity of observing them would not need to ask. Their faces showed they were thrilled and that they had confidence that they could do the thing they were undertaking. They showed poise and speed, and according to the hotel chef—much ability.

"I enjoyed every minute, wouldn't have missed it for anything."

"It was an invaluable experience to me. I was surprised we could gain so much information and actually do so many things in such a short time."

"I will never stay at a hotel without appreciating as I never have before the service I receive."

These are some of the remarks made by the students upon their return, while the manager of the hotel writes: "We are still hearing a great many complimentary remarks about the service and the wonderful dinner served by your girls, and sincerely trust that you will see your way clear to make this an annual event. I wish to take this opportunity to again thank you and the young ladies for making last Friday night one of the most enjoyable ever had at the Multnomah Hotel."

The school of home economics of the Oregon Agricultural College believes that such experiences are worth a great deal to the young women participating and to the school they represent, for these young women did demonstrate that college women can put theory into practice, that they can fit into the workaday world; that they can adapt themselves to new situations, and that trained minds can meet and solve new problems with ease, intelligence and efficiency.

FOUR HOME ECONOMICS STUDENTS OF THE OREGON AGRICULTURAL COLLEGE AT WORK IN THE MULTNOMAH HOTEL KITCHEN.

Safety Precautions for the Circular Saw

Edward J. Crussell, Sacramento, Cal.

IN a former article, the assertion was made that there were times when the safety guards could not be used. One of the worst machines in this respect, in so far as classroom work goes, is the circular saw. For work in which there is very little danger, that is, in the ordinary ripping or crosscutting of large pieces, the guards can be used; but for work in which there is a great deal of danger, such as the ripping of short pieces, cutting of tenons, rabbeting, using the dado heads, etc.; work which forms by far the greater part of schoolroom efforts, the guards supplied by the makers of the machine have to be removed, and the workman must either supply makeshift guards of his own, or trust to luck and careful workmanship. It is exactly the same thing as if an automobile were supplied with brakes which would work satisfactorily while the machine was running at slow speed on a straight and level road, but which had to be taken off altogether as soon as the speed exceeded ten miles an hour, or as soon as we got into the steep and crooked roads of the mountains.

The circular saw, or more properly the variety saw, supplied by the manufacturers of the present day is a long, long way ahead of the machines used by our forefathers, but even the best of them still have defects which are man-traps for the unwary or careless.

The more popular type of this machine now used in the classroom is fitted with a rising and tilting saw-table, and a mandrel, or spindle, which will accommodate dado heads up to an inch or more in width, and which has one end fitted with a drill chuck for horizontal boring. In the top of the table, there is a removable section about six inches wide and eighteen inches long, which has to be removed altogether when the dado heads are in place, and one of the first safety precautions that should be taken is to make wooden filling pieces to fit in the top of the table around the dado head, as shown in Fig. 1.

With the widest dado head in place, there is sometimes danger that the crosscut guides, or gauges, will not clear it. To prevent any mishap of this kind, it is well to put the widest dado head on the machine and make an actual test. If the guide is so long as to interfere, get a hacksaw and cut it off; don't trust to luck or a good memory; someone with a poor memory may some day run the guide onto the cutter.

If the boring bits are held in the chuck with a set screw, every precaution should be taken to see that this set screw doesn't project beyond the surface of the chuck. There are few things more dangerous than projecting set screws revolving at high speed; if they are cut off flush and have a slot sawn in their ends, they may be tightened with a screwdriver almost as well as they were formerly tightened with a wrench.

The next thing to be considered is the ripping gage. As supplied by the makers these gages often extend beyond the back of the saw; any practical sawyer knows what a serious evil this is. Any device for guiding stuff to the saw should end in such a manner as to let the stock fall away from the saw as soon as the cutting is done. Where the guide extends beyond the back edge of the saw, the stock having no chance to get away, is often forced onto the back teeth, from whence it is thrown forward with the speed of a bullet. The writer knows of a case where a hardwood sliver about twelve inches long, catching on the saw in this manner, was thrown forward with such force that it penetrated the sawyer's arm at the wrist, traveled the full length of his forearm, and projected from his elbow. It would undoubtedly have pierced his body just as easily if his body had been in the way of it. Another fault of the gage which extends beyond the saw is, a green workman, who when "taking away" from the saw,

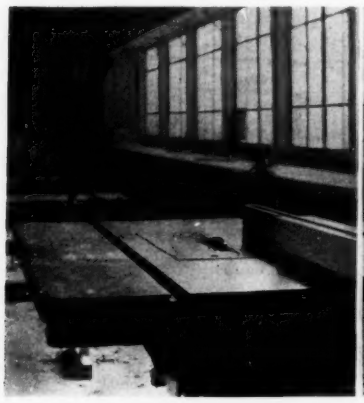


FIG. 1.

FIG 2.

FIG. 3.

may neglect to draw the timber straight back until it has cleared the gage. It is easily possible to break a circular saw by prying sideways on it while it is revolving at high speed.

There are, however, some special jobs, such as cutting tenons, or grooves, or rabbets, where a gage which extends beyond the saw is needed, so instead of cutting the gage shorter, it should be faced with a piece of hardwood, as shown in Fig. 1. This is easily managed by boring a couple of screw-holes through the gage. When a full-length gage is needed, the hardwood facing is removed.

The foregoing are precautions to be taken regarding the makeup of the machine itself; what follows are precautions to be taken in its use. First, in the boring attachment, make it a rigid rule and teach it as a habit, that the boring attachment must never be used while the saw is in place on the mandrel. Failure to observe this rule will, sooner or later, inevitably result in accident. We have seen a skillful workman finish the boring on a piece of wood and then start to pile it on top of the saw table, forgetting, and in some manner not seeing, that there was a rapidly revolving saw in the way of it, with the result that the work was not only spoiled, but torn from his hand and flung full length of the shop. We have seen the saw table raised entirely above the saw as a safeguard, and have then seen another workman come over and sprawl across the top of the table and while talking to the man who was boring, try to poke his fingers down through the slot in the table. No, he wasn't trying to feel if the saw was sharp; he didn't know it was there. He was merely fidgeting with his fingers as most people do when there is something for them to fidget with and their minds are occupied with something else.

In like manner the boring bit should be removed when the saw is in use. While not as dangerous as the saw, it can easily cause a serious accident and the saw being in use is likely to draw attention from the bit and enable it to catch the thoughtless workman unawares. It is sometimes a little difficult to remove a boring bit immediately after it has been used because it has become hot and expanded in the chuck. In a case of this kind, many workmen pound on the chuck with a wrench or hammer in an endeavor to jar the bit loose; a better way is to take a monkey wrench, close the jaws of it down tight onto the bit, pull the handle of the monkey wrench over sideways so as to get a grip on the bit, and then revolve the chuck by pulling the belt around by hand. The most stubborn bit may be removed in this way without injury to either it or the chuck.

The best boring bits for this machine are twist drills. Much of the boring is for the purpose of cutting mortises and with a twist drill one may clean out the entire mortise from one end to the other. Then again, they are much safer; the horizontal boring machine, fitted with a bit having projecting lips or a threaded nose, is a treacherous device, and if it be used, care should be taken to see that the bit does not project beyond the edge of the boring table, even when the latter is pushed in to its closest. The writer knows of an accident occurring from this means which is too horrible to describe.

The safety precautions necessary for operating the saw itself depend largely upon what is being done on it and cannot be entirely covered in a magazine article. In the ordinary ripping and crosscutting of long material there is little danger if anything like proper care is exercised. The danger zone is limited to the actual space occupied by the saw above the table; there is no need of the operator putting any part of his person anywhere near the limits of this zone, and unless the saw is twisted or in some other manner mistreated, there is little danger of it leaving this zone in order to take a bite at him.

The starting and stopping device should be so located that it may be easily and instantly operated at all times; the saw must be kept in good order, properly sharpened and set; care must be exercised in feeding the work to the saw, and a sharp lookout kept for knots, slivers, or other loose pieces which might catch on the saw and be thrown forward. Cracks or shakes in the material must also be carefully watched as they often form loose pieces or tend to lead the saw out of line. There is no real need for the sawyer to stand directly in line with the saw and most of us who have had, at some time or other, to duck flying pieces, have learned to stand to one side, so as to give them clear passage. A piece of board about 10 by 12 inches in size may be suspended on a bar from the ceiling and hung just in front of the saw, as shown in Fig. 2. This prevents sawdust flying in the face and will also stop knots and other small pieces which may catch on the back edge of the saw; in fact, it answers almost as well as most of the elaborate saw guards put out by the manufacturers. It should be made adjustable in height to suit the diameters of different saws, and may be pivoted so as to be swung out of the way, or so attached to the ceiling that it may be removed altogether. CAUTION! If this latter method is used, do not attempt to hang up or take down the device while the saw is running; to do so would be taking unnecessary risks.

For ripping or rabbeting short pieces, a push stick should always be used. Even with the push stick great care must be taken, otherwise the saw may strike the push stick so as to drive the end of it into the hand, or perhaps kick it out of the hand altogether and let the hand drop down onto the saw. When ripping short material the table should be raised until the saw only just comes through the material. This is in direct opposition to the advice usually given, which is to have the saw projecting through the material as far as possible at all times, as in this way the saw cuts better and does not have the same tendency to throw the material

back toward the operator. The fact remains, however, that when ripping short stock, there is more danger from a saw which projects far above the table than there is from the stock being thrown back. This latter fault can always be overcome if the stock is properly fed to the saw.

For rabbeting or grooving, particular care must be taken to see that the hands are not placed on the material over, or beyond, the saw, especially when stop grooves or stop rabbets are being cut. Because the saw does not project through the material, the workman is often tempted to hold the material down with his bare hands placed directly over the saw, especially as in this form of cut, the saw has a tendency to lift the material upward; placing the hands on top of the material does well enough when the material is large and everything is working properly, but with thin material, if the hands or the push stick should slip, the natural result is that the work is kicked out from under them and the hands come down on the saw.

Another source of danger to the uninitiated is the small blocks or strips that are cut off and are left on the saw table. One is often tempted to remove these with the bare hands. It is much better to leave them, either to be pushed off by following cuts, or to be removed after the saw has stopped. Sometimes the novice gets excited because a small sliver is caught by the saw and carried through between it and the edge of the slot in the table. Let it go; if it goes through all right; if it doesn't, stop the saw before trying to take it out.

Ripping thin pieces edgewise is another source of danger. If they are long enough, it is best to rip half the length of the piece from one end, then reverse it and rip from the other end, which obviates the need of the hands coming near the saw. If there is much ripping of small stuff to be done, it is often a good scheme to clamp a piece of board on top of the saw table and let the saw cut its way up through it. This board is left on the table while doing the sawing and provides a surface which has no vacant spaces around the saw for material to drop through.

For crosscutting short pieces, the crosscut guide or fence should be extended with a piece of board screwed to the face of it until it reaches up close to the saw. This should always be done when making miter or bevel cuts, as swinging the fence around to get the proper bevel usually brings the end of it some distance from the saw.

For crosscutting duplicate pieces, the ripping gage can be set to the correct distance on the right side of the saw, and then, by placing the material against the cut-off fence, and feeding it over against the ripping gage, the material may be rapidly cut to the proper length. When using this scheme, care must be taken to see that the ripping gage does not extend beyond the front of the saw, as already explained.

For cutting dadoes with the grooving head, hold the work firmly, stand to one side of the line of cut, and in no case put the hands on top of the material over the cutter.

For ripping material on end, that is, material which is passed vertically over the saw, as when ripping the sides of tenons, make another fence of the same height as the ripping fence, and fasten it to the table so that the material to be cut is passed through between them. This arrangement is shown in use in Fig. 3, and in our case, we were able to use the slide of the crosscut fence to fasten our wooden fence to. Only the most careless of workmen could get cut with this appliance in use, as in order to do so he would have to put his fingers down into a slot no wider than the material is thick.

Wide boards may be re-sawn on the circular saw by making a cut in each edge of them. Where this is done, it is better to leave about one-fourth inch in the center of the board uncut. This small strip holds the two pieces together and helps to keep them upright; it can be easily severed afterward with a hand saw. If there is a bandsaw available, the best way to re-saw wide boards is to cut about one-third the distance from each edge on the circular saw, and finish the center portion with the bandsaw.

In order to head off needless discussion the writer will close with the statement that the criticisms contained in this article are intended to apply to the guards on a variety saw, doing general work, in a manual training or vocational woodworking classroom. They do not apply to rip saws, or cut-off saws, doing only one line of work in a large shop or mill. In the latter case it is possible, of course, to keep the guards in place, day in and day out, and so make them serve their purpose.

"We must somehow prevent the tragedy which will ensue if the work-boy and the work-girl bid good bye to 'education' and settle down to drudgery. This we can do only by keeping our contact with them. The agency for contact is the Continuation School."
—Senator George Wharton Pepper.

An Experiment with a Work Sheet in a Manual Training Class

Daniel Darney, Director of Manual Arts, Leominster, Massachussetts

TO ELIMINATE the waste of time and to reduce the repetition of directions, experiments have been made in the woodwork shop with a work sheet or outline of the work to be accomplished. The plan as explained below has worked out very successfully in the freshman classes in woodwork. It has reduced the opportunities for loafing and supplied the boy who has been absent from class with the necessary information to go on with the work. The tasks are allotted to a certain day; therefore, each boy knows whether he is keeping up. This sheet takes care of the pace of the class, and the boy, fast or slow worker, has the information at hand just when he needs it.

The sheets are typewritten by the students in the commercial department at the high school and one copy is supplied each boy in the woodwork class in which the model or project is made.

The Model Motor Boat illustrated was made from the following work sheet:

WORK SHEET.

Model Motor Boat.

Look up facts about motor boats and furnishings.
The work as specified must be completed in the period to finish the boat on time.

Day	Step	Work to be finished	Check
1st	1	True up stock 2¼"x3"x12".	
2nd	2	Mark out hull. (See sketch on blackboard.)	
	3	Shape up bottom of hull.	
3rd	4	Finish up bottom of hull. Scrape and sandpaper.	
	5	Get out stock for keel $\frac{3}{16}$"x¾"x6" and shape.	
	6	Get out stock for cabin ½"x2"x2½" and shape.	
4th	7	Mark out and make the pit.	
	8	Clean up all parts now ready.	
5th	9	Assemble all parts now ready.	
	10	Get out stock for cradle— 2 Pcs. ¼"x½"x12". 2 Pcs. ½"x11½"x2¼".	
6th	11	Make the cradle.	
	12	Get out stock for the seats. Shape up seats to fit in the pit. (See sketch on blackboard.)	
7th	13	Bring to shop for next lesson: 1, Metal pant button; 2, Pc. tin 1½x¾ for propeller and rudder; 3, Top tooth paste tube for search-light; 4, Empty 22 blank cartridge shell; 5, Pc. tape or ribbon for flags. All other furnishings.	
	14	Paint cradle.	
	15	Sandpaper seats.	
	16	Locate holes for propeller, rudder, search-light, etc.	
	17	Clean up boat ready for painting.	
8th	18	Make propeller, rudder, etc. Solder to brads.	
	19	Paint boat, etc.	
9th	20	Put on finishing touches. Sandpaper ready for second coat of paint.	
	21	Assemble all parts and finish up the boat.	

The price of this model is ..... If you wish to purchase your boat mark your name tag SOLD.

The work sheet shows the boy his task for the period and he is at liberty to go as fast as he is able to do consistently with good work. A spirit of competition enters into the work which tends to speed up the slower workers as well as to reduce the chances of the boy in the class to cultivate the habit of loafing in the period at the shop.

The work sheets answer many questions, thus saving the time and attention of the instructor in repeating the same information to the individual boy as he may need it.

The necessary pieces of stock were passed to the class for the Model Motor Boat and after the importance of the center line and working from this line were emphasized, the hull was shaped with the plane. The pit was marked out and made with the bit and bit brace and cleaned with the chisel. The roof of the cabin was made from a piece of scrap wood. A narrow strip of pine was used for the keel which was braded to the bottom of the hull after the hull had been finished with sandpaper.

Much interest was shown by the boys in the furnishings for the boat. The top of a tooth paste tube made a very satisfactory searchlight, while the steering wheel was a metal pant button. The propeller and rudder were cut from an old tin tobacco box. These were soldered to brads. A wind shield was evolved from the tin binding around an old case of a pocket comb, while a piece of celluloid served as the glass. The engine exhaust pipe was made by embedding an empty 22 blank cartridge shell in the wood.

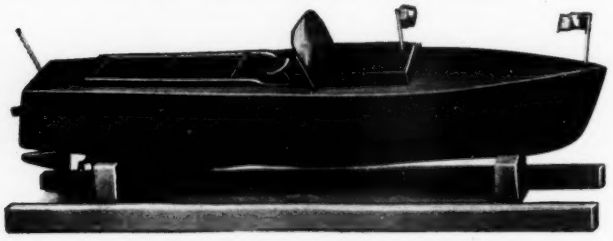
Some of the boys lined the pit of their boats with color prints of oilcloth cut from advertisements in magazines. Others upholstered the seats with thin real and imitation leather clipped from old note-book covers, etc.

The deck of the boat was given a planked effect by ruling a series of parallel lines with a sharp lead pencil.

Life-savers, made from insulated wire, or a small boat whittled from wood and attached to the motor boat as a tender, were added to the different models. An effort was always made to keep all of the fittings and furnishings as near to scale as it was possible.

The boats were carefully painted in bright colors, some with a water line in contrasting color and some without the line. The cradle was painted in another color. In choosing the colors the aim was to make the toy bright and snappy with good color combinations.

The model was very popular with the boys and several outsiders came to the shop and tried to purchase one of the boats. Every boat went home with the maker.



BOAT MADE WITH THE USE OF WORK SHEETS.

In the freshman class the boys are allowed three periods of about fifty minutes each per week. The motor boat model was finished by every boy in the time specified on the work sheet.

A record of the pace of each boy is kept in the following manner: A sheet with the names of the boys in the class and the number of the steps and the days' assignment listed across the top of a series of columns following the list of names down the left-hand side of the paper is used. At the close of the period just before the class is dismissed, the boy's name is called and he answers with the number of the last step completed. The date is entered in the column against the boy's name in the column under the proper step number. Any other information may be entered on this sheet.

After the boys have made a few more models from these work sheets, I have planned to allow different members of the class to make out a work sheet for the entire class, and later to make out one for their own individual model or project.

A POSTER AS A CORRELATION PROJECT.

Gertrude E. Taylor, Supervisor of English and William V. Winslow, Director of Industrial Arts, North Tonawanda, N. Y.

A "Better English" poster as a part of a campaign to improve the speech of elementary school children furnishes a useful project in industrial arts. Opportunity is here offered to study commercial design and the processes of printing.

To make the poster, pictures may be cut from magazine covers, the children supplying the lettering and arranging the parts to secure good spacing. Colors are used, which go well with the illustration.

The procedure is as follows: The children are directed to bring to school magazine covers which are suitable for posters, the size of the poster to be eleven by fifteen inches. All the children are urged to bring covers which they think will make good posters, as many as they can obtain in their homes. The older the magazines the better for the purpose—other things being equal; if a cover is old enough it will appear new. It is, then, not necessary to tear covers from new periodicals.

In a later lesson the teacher will exhibit the covers brought in by the class. Holding up a cover she will ask the boys and girls to suggest a title suitable for a poster. Titles thus obtained will be written on the blackboard, the best one to be used for the particular poster under discussion. In illustrating common, ungrammatical expressions it is of course well to make the correct form in a more conspicuous lettering than the incorrect one.

The accompanying posters are four of a great number made by children of the fourth, fifth and sixth grades and represent a correlation between English and art. It will be found that such a correlation motivates both school subjects. Teachers and pupils alike are interested in posters as a means to better speech.

TYPICAL POSTERS MADE IN THE NORTH TONAWANDA SCHOOLS.

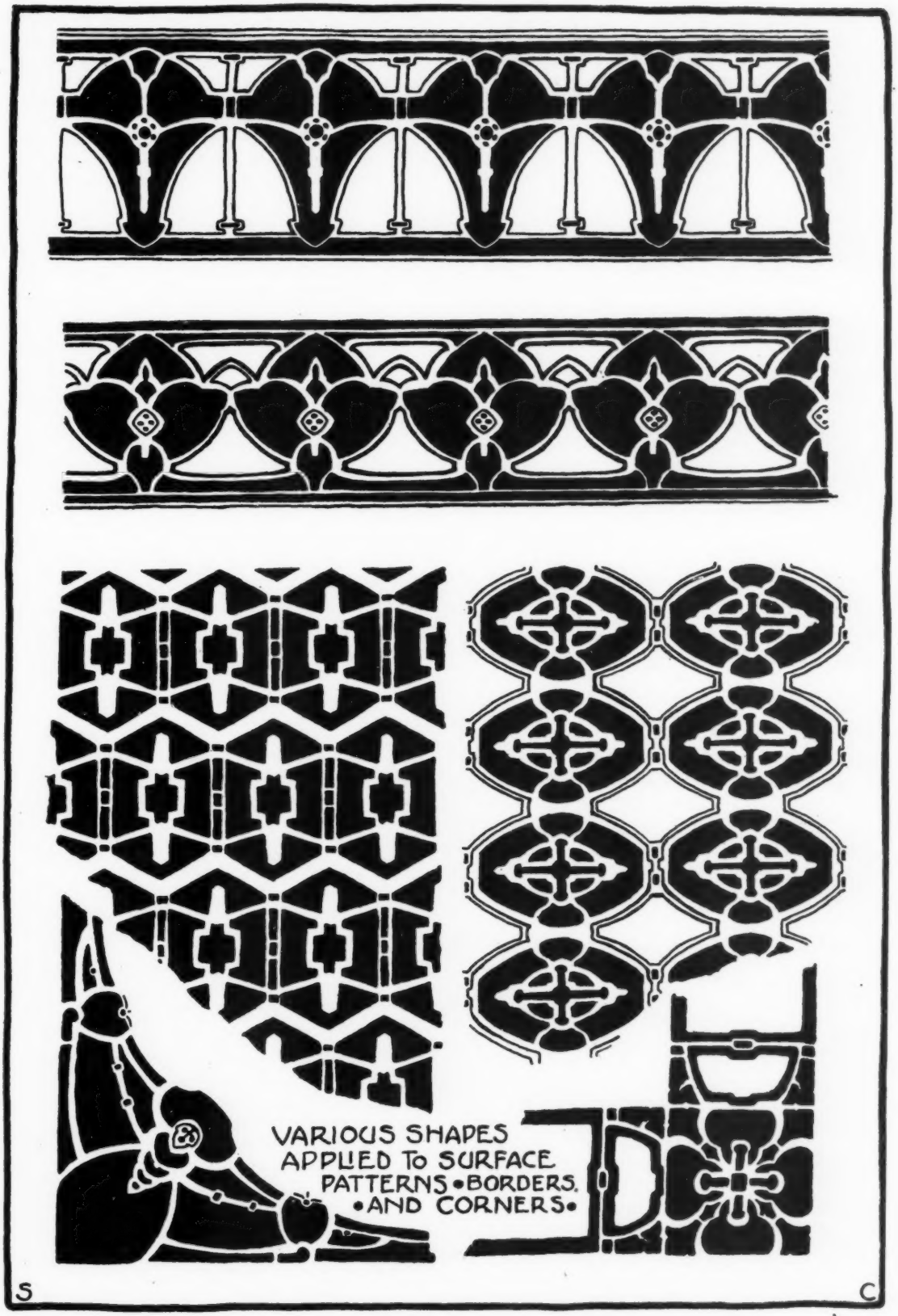


PLATE VII

This plate is the seventh of a series of twelve plates, by Miss Sara Cohoon, instructor of art in the Junior High School, Springfield, Mass.

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN
Editors

EDITORIAL

FARMING AND OTHER INDUSTRIES.

"We teachers must learn that it is our duty to develop each farm boy so that he will not only enjoy living on the farm, but will also be so well trained that he will find his life there a distinct financial success." So says A. K. Getman, State Supervisor of Agricultural Education for the State of New York. Mr. Getman also states that advisory boards made up of successful farmers are a great asset to the work.

These advisory boards assist the teacher in outlining courses of study, promoting interest in exhibits, and encouraging reluctant parents to place their boys under instruction. While instruction in the various industries must differ with different localities and under different conditions, these statements apply to other industries besides farming.

The schools are responsible for such development of the boy that he will be able to earn his living at the work in which he is trained at school. It is doubtful if he will be happy in his work unless he can look forward to earning a living at it.

The incentive of earning a living is a worthy one. The desire to secure a living by profit that is not earned, or by other questionable methods, is to be disparaged. A worthy schooling should not lead to the desire for a soft job.

We are agreeably surprised to hear Mr. Getman assume the responsibility for so training boys that they can make a living in a particular kind of hard work and be happy in it. That great responsibility may well be placed on the schools, and the teacher shares in the responsibility.

When all teachers of the Industrial Arts assume such obligations, the schools will solve some of our social and economic difficulties. The suggestion that the Industrial Arts teacher bring to his aid an advisory board of experience and success in the occupational lines is timely and valuable.

PUTTING IT STRONG.

The claim is now made by those interested in training for recreation that since the hours of labor become shorter and the time for recreation becomes longer, we must devote as much school time to one as to the other.

This, we think, is putting it strong. All play or all work will make Jack a dull boy. Half play and half work would not make him capable at his work, for the most vital interests of Jack's life should occupy the greater part of his time, and Jack should be more ambitious for the success of his work than for the enjoyment of his play. Indeed, we are inclined to help him just as little as possible with his play and all we can with his work.

Not that we would disparage play and the proper direction of it, but play can so readily be directed into a lifeless formality or an obsession which dominates the whole of Jack's interest that we are fearful of overdoing the matter.

Recreation shows evidences of becoming the most important business of the school. More money and time is now devoted in some of our schools to the development of athletic teams than to any other one interest. The only rational change can come through the participation of all students in some sort of recreation for a suitably small part of their time, and the reduction of excessive training for a few athletes.

ENOUGH OF LEADERSHIP.

With the development of universal school training comes a change in the idea that boys and girls in school are trained for leadership.

It may be announced that there is an abundance of leaders, but a lack of ability and opportunity to select the right leaders.

Every social order may be judged by the opportunity it offers for self-development, and the social order depends for success on the general development of all rather than the ambitious development of a comparatively few leaders. Leaders may be found to measure up to the standards of their selection.

NEEDS OF THE TIMES.

Why all the strikes, unrest, and disturbances? Various reasons are assigned by interested parties, but there are reasons more fundamental and far reaching than those usually mentioned.

First, there is a profound and alarming ignorance concerning the ordinary laws of economic relationships involving profits, renumeration, ownership, and property values.

Second, there is just as profound a lack of information concerning sociological aspects of labor, wealth, production, and the obligation and human relationship between employer and employee and the obligation of both to the public at large.

Third, there seems to be a confusion concerning the function, purpose, and source of government and the proper attitude of the individual citizen toward it.

Fourth, there is a perfectly appalling disregard of the ordinary moral sanctions of human society. Murder, dishonesty, jealousy, and unfair dealing are all too common in modern business and industrial life. There never was a time when the need was so tragically pressing for a return to the simple doctrine of the Golden Rule!

There seems to be only one solution. That is a greater emphasis, from a fair and impartial standpoint,

both in the elementary and high schools on the simple principles of economics, sociology, government and citizenship, and the elemental rights and wrongs of human relationships and conduct.

FOR THE ENCOURAGEMENT OF THE NEW TEACHER.

One of the important results of the manual training movement and the agitation for vocational education is the wide-spread study of the whole problem of education. The coming of this new element in education has been a challenge to certain long-established traditions. The manual training teacher became an educational philosopher on his own account, and projected new theories which the old education could not ignore.

In turn the theories and practices of this new education came under the severe criticism of many of the educators of the time. The manual training movement, however, enlisted from the start the sympathy and support of practical business people and was enthusiastically welcomed by vast numbers of people whose children were in the public schools.

At first, the teachers of the regular academic subjects interpreted the new movement as a reflection, if not an attack, on their work and evidences of hostility were frequently found among them. As time went on it became clear to them that an attack was not being made upon what was being done by them, but that attention was simply being called to *what was not being done.* When it appeared that simply a new element was being added without materially encroaching upon the traditional subjects and their time, a friendlier and more generous attitude grew up toward the new work and its teachers.

Only those who encountered these early obstacles can appreciate the zeal of the advocates of the new education represented by manual training and the embarrassing and discouraging experiences through which they went.

Now, under the universal discussion and study of the world question of education, the theories and practices of this new education have undergone a refinement and a liberalization that have removed opposition and have placed it in the category of accepted educational doctrines. The next generation will witness a more complete interweaving of manual and industrial activities with the regular program of the public schools.

THE NEW YEAR AND THE NEW TASKS.

The new school year is about to open in the midst of the most disturbed and confused conditions. The reaction on the schools cannot help being very marked.

In some quarters perfectly fatal retrenchments will be witnessed. In other places, great difficulties will be experienced in the matter of attendance. Compulsory attendance laws will probably be more difficult than ever to enforce. The problem of equipment, materials, and supplies bids fair to become one of the most serious handicaps.

There is certain to be a kind of nervous restlessness in keeping with the conditions in the business and industrial world. It will tax the ingenuity of teachers to offset this condition and to win from the students ready and interested cooperation in whatever work may be undertaken.

This, of all times, is the time to eliminate waste—waste of time, waste of materials, waste of nervous energy, and waste of opportunity. The people are not in a tolerant mood. They are disposed to be impatient, to criticise, and to condemn. The teachers of industrial work have the great opportunity to help allay the present disturbed feeling; to hold the confidence of the people in the effectiveness of their work; and to prepare the students as well as possible to meet the emergency which the times present.

THE MANUAL TRAINING MAGAZINE CHANGES ITS NAME.

A new magazine has just come to our desk, the Industrial Education Magazine. It is a bright, intelligent looking youngster and we can't resist the impression that it bears a kind of familiar "family resemblance." The Industrial Arts Magazine will take a good deal of paternal interest in watching the growth and development of the newcomer.

Here's the best o' luck to it.

There's a great deal of good that can be done in the world if we are not too careful as to who gets the credit. —*Talcott Williams.*

Knowledge is not only power, but leads to profit.—*Roger W. Babson.*

DISTINGUISHING CHARACTERISTICS OF MAHOGANY.

Only true mahogany from tropical America, "African mahogany," and "Philippine mahogany" are commonly sold as mahogany in this country, but at various times over 60 different species of timber have been sold under that name. Although all of these species resemble each other in varying degrees, tropical American mahogany and "African mahogany" possess one important characteristic in common. This is the occurrence of dark amber-colored gum in many of the pores. The gum does not fill the pores but is recognized as dark specks or streaks in the the pores as seen on end or side grain. This gum is barely visible to the naked eye, but is easily seen through a hand lens with a magnification of 10-15 diameters. In preparing the end grain of the wood for examination, a very sharp knife should be used to make a smooth cut.

Some other woods have similar dark masses of gum in the pores, but none of these are commonly substituted for mahogany. Among them are crabwood and sapeli, species imported from South America in small quantities only, and the Cedrelas (Spanish cedar, etc.), which are rarely sold as mahoganies, and are easily recognized by their odor.

True mahogany has fine, continuous, concentric lines on the cross section usually from ⅛ to ½ inch apart, which distinguish it from "African mahogany" in which these lines never occur.

"Philippine mahogany," although not marked by the black masses of gum, is distinguished from true mahogany and other so-called mahoganies by the presence of fine white, tangential lines ⅛ inch to several inches apart, readily visible to the naked eye, and showing under a lens as rows of small openings filled with a white substance.

A more complete key and description of mahogany and so-called mahogany, which describes common species in detail, may be obtained from the U. S. Forest Products Laboratory, Madison, Wis.

PROBLEMS AND PROJECTS

The Department of Problems and Projects aims to present each month a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taborets, towel holders, etc., which have been made from time immemorial, ad nauseum.

Drawings and manuscripts should be addressed: The Editors, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.

BUTTERFLY TABLE.

Lee M. Klinefelter, Norfolk, Va.

This little table is a reproduction of an old Colonial table at present in the Metropolitan Museum of Art, New York City. The original was made of maple about the year 1700, and was given to the Museum by Mrs. Russell Sage.

The drawing is from sketches and measurements made from the original table, and is accurate in all essentials.

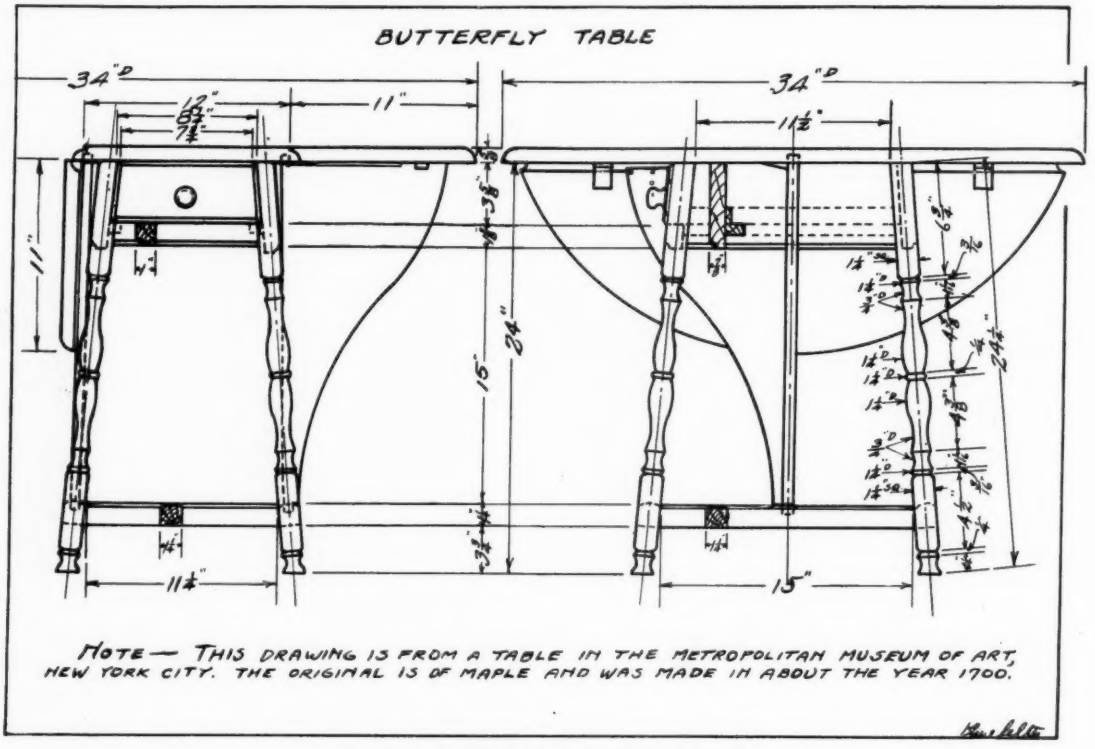
The laying out and fitting of the frame of this table is an interesting and exacting problem, due to the slope of the legs. The top is round, and in three sections as shown, a rule joint being used between the center section and the leaves. This joint can be cut by hand or with a combination plane. In any event the proper fitting of the leaves and hinges will be quite a problem in itself.

In the original table the sides of the drawer are dovetailed to both the front and the back, and the dovetails in the front secured with wooden pegs. The top of the table also is held down with four square pegs which are about ⅜ inch square. These are details which can be followed or not at the maker's choice. However, iron clips serve at least as well to hold on the top and will not disfigure it as do the pegs.

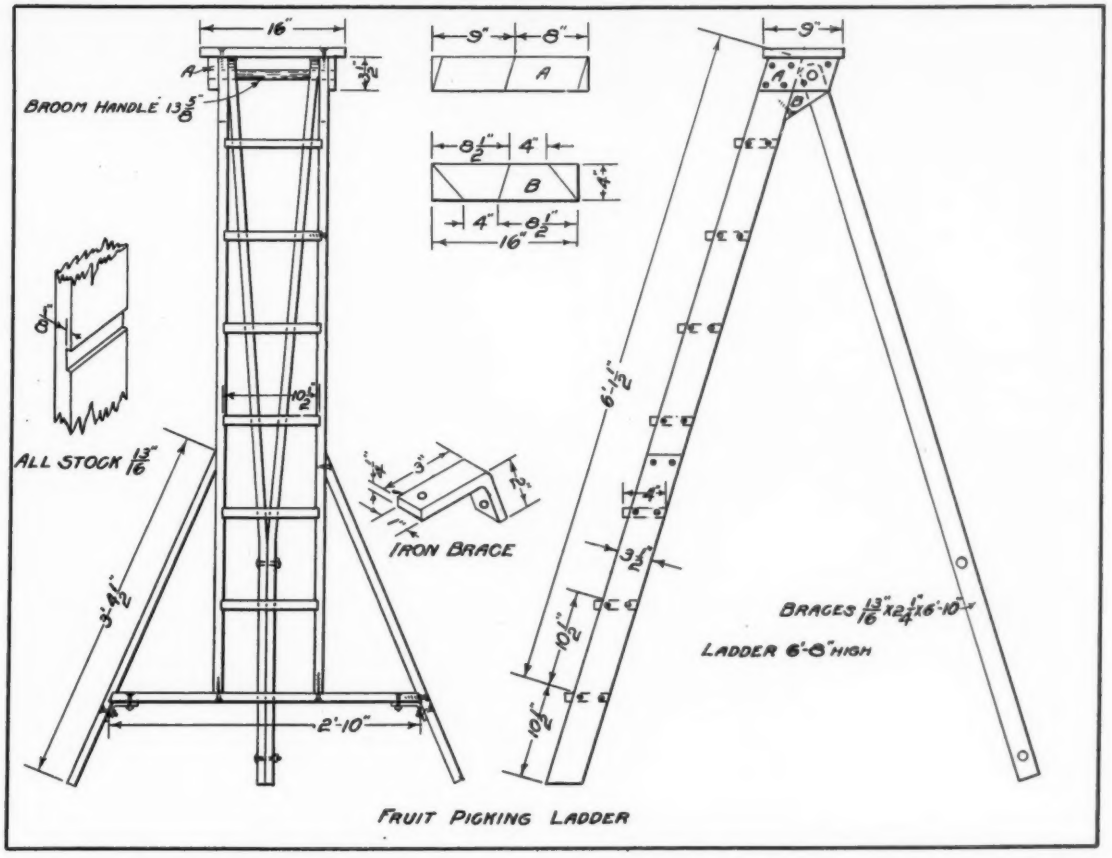
The table may be made of maple if an exact reproduction is desired, but walnut will make a more attractive table and will be thoroughly in keeping with the period and style.

If walnut is used a simple and appropriate finish may be given by applying a dark filler made up with considerable oil to bring out and enrich the color of the wood, followed by wax, well rubbed. Of course a shellac and rubbed varnish finish may be applied, but the simpler finish seems more in keeping with this style of furniture.

THE COMPLETED BUTTERFLY TABLE.



DETAILS FOR MAKING A BUTTERFLY TABLE.



FRUIT PICKING LADDER.

L. M. Roehl, Cornell University, Ithaca, N. Y.

Fruit farms require several ladders varying in height. The height of this fruit picking ladder is especially adapted for picking plums, apricots, cherries and most apples and pears. It is built of basswood, spruce or other soft light wood and consequently is light and easy to carry and handle about the trees. It is especially rigid and stable due to the three point suspension and wide spread of the two main standards.

Bill of Material.

Pieces	Dimensions	Use
2	13/16"x3½"x6'-1½"	Main standards
2	13/16"x3½"x3'-4½"	Side braces
1	13/16"x4"x2'-10"	Bottom step
6	13/16"x4"x10½"	Steps
2	13/16"x3½"x8"	Side cleats
2	13/16"x4"x8½"	Braces
1	13/16"x9"x16"	Top
2	13/16"x2¼"x6'-10"	Front standard

1 piece of broom handle 13⅝" long
46—2" No. 10 flat head wood screws
12—1½" No. 9 flat head screws
2—¼"x2½" carriage bolts
2 pieces of iron ¼"x1"x5"
4 stove bolts ¼"x1½"

Directions.

The angles for both ends of the main standards, side braces, side cleats, upper ends of the top braces and the gains in the main standards for the steps are laid out by use of the T bevel set at 12" on the blade and 3-11/16" on the tongue of the steel square.

The cheek or side cuts on the side braces are laid out out by use of the T bevel set at 12" on the blade and 5⅜" on the tongue of the steel square.

It should be noted that the steps are gained into the main standards and side braces ⅛" and held with 2 2" No. 10 screws at each joint.

The side cleats are fastened to the main standards and top brace with 1½" No. 9 screws placed as indicated in the drawing.

A 2" screw is used at the bottom end of each top brace to fasten it the main standard.

The top is fastened to the upper ends of the main standards and top braces with 8 2" No. 10 flat head screws.

Two ¼" x 2½" carriage bolts are used to fasten the two front braces together at the bottom as indicated in the drawing.

The ladder is greatly stengthened by the use of two iron braces, bent as indicated in the detail drawing and placed below the bottom step at the ends. They are fastened to the step and side brace with ¼" x 1½" stove bolts.

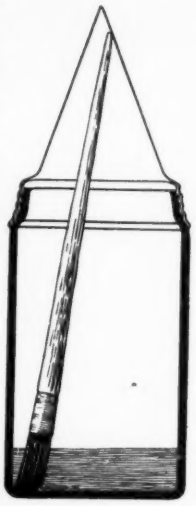
A hole of the same diameter as the broom handle at hand is bored through the side cleats, top braces, and upper ends of the front standards for the broom handle. The two members of the standard are spread to their final position and the holes bored at an angle. The round stick is held fast to the standards with a small nail driven through the edge of each standard and into the round piece. The round piece rotates in the holes in the other parts as the front standard is swung back and forth.

CAN THE SHELLAC

J. C. Nicholson, Strathmore, Calif.

It is amazing how many troubles have arisen in a matter so commonplace as a suitable means of keeping shellac and brush in readily available and decent condition. Stated briefly, the problem is to prevent evaporation; to keep the brush soft and pliable without having a superabundance of shellac gummed over most of the handle; to keep the same from the top of the can where the lid fits, so the lid may be easily removed and yet be kept approximately air-tight; to avoid having always too much shellac on the brush—and I dare say there are still other worries to be met with. While not being absolutely

ideal, a fair method of meeting the situation is shown in the sketch. Simply take a common pint glass fruit jar with a screwed lid, cut out most of the top of the lid, and solder a cone-shaped piece of tin over the hole as a space for the brush handle to extend up into, keeping only a little shellac in this can as shown but using a like can with a plain top as a supply can. A rubber is hardly necessary on the can and since there is a shoulder near the top, the surplus shellac on the brush may be wiped off at each using on the under side of this shoulder and thus avoid getting shellac on the outside where the top screws on. When an excess amount of this partly dried shellac accumulates on the inside of the can, simply exchange tops on the two cans, thus turning the supply can into a service can and vice versa, and this excess shellac will be dissolved and made usable again.



SHELLAC CAN

INTERNAL SHAPER TOOL.

W. Ray Challoner, Appleton, Wis.

This tool holder will prove of interest to any manual-arts man who may have a shaper in his shop. By its use, keyways may be cut and any internal shaping job accomplished without any tool trouble. It has many advantages over the extension or gooseneck tool holder in the tool post or one where a special apron is provided or the bar mounted directly in the tool post socket. This problem may be made by an advanced student, and is a very useful article when complete.

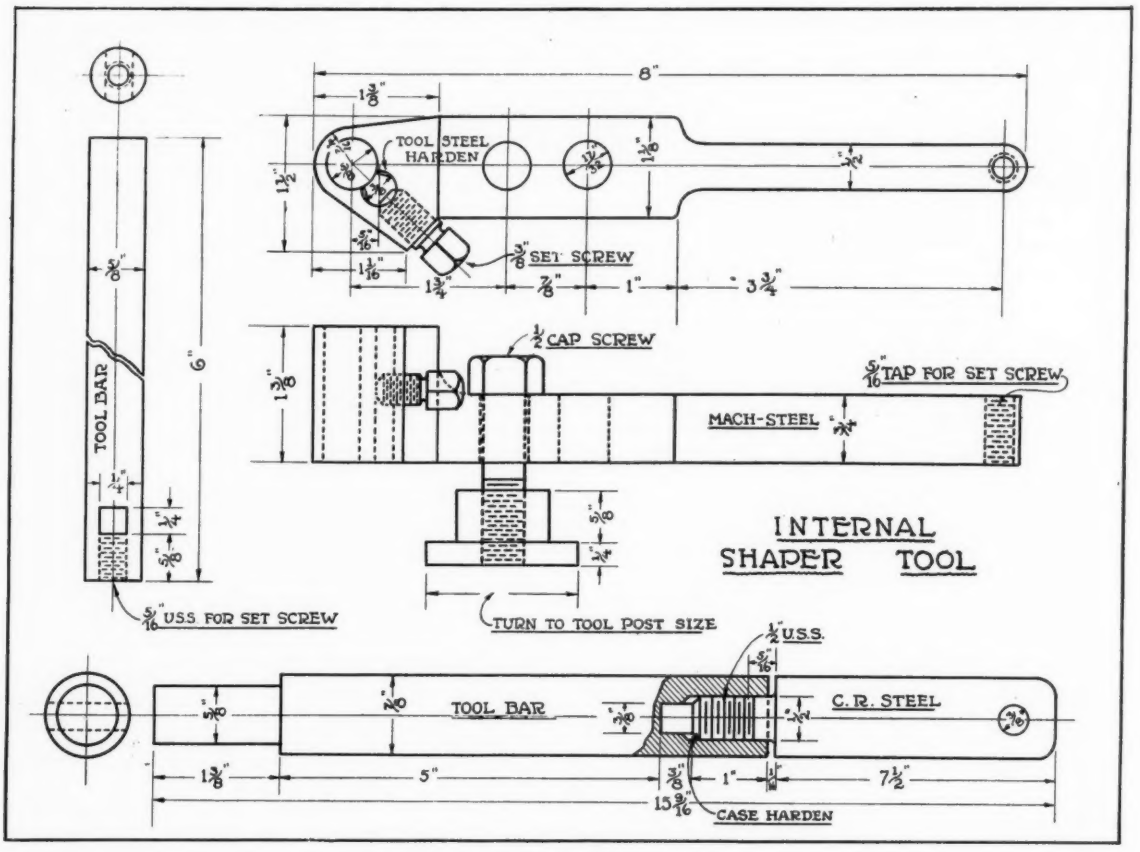
The body of the holder is made of 1½" by 1½" by 8" machine steel, shaped as per drawing. The drilling of the holes for the bar and lock pieces should be done as follows:

First lay out carefully for all drilling. Then drill and ream ⅜" hole for lock piece. Then drill and top hole for ⅜" set screw. File a flat on the lock piece so that the screw will have a good bearing. This at the same time will form a groove which will hold the lock piece in place when the screw has been loosened.

Before drilling and reaming the ⅝" hole for the bar, tighten the set screw against the locking piece so that it will not turn when drilling and reaming this hole. After removing the locking piece, relieve the sides so that it will press against the bar when the screw is tightened. This will insure a proper fitting lock and is an easy way of making it.

The 5/16" tapped hole in the end of the holder is for the 5/16" set screw which will come in contact with the tool slide of the shaper and prevent the tool holder from tipping as the tool is drawn back on the return stroke. It also enables one to work all around a square hole without removing the work from the shaper vise if he so desires.

The large bar is made from two pieces of cold rolled steel. The end forming the locking screw is made long so that it will extend through the job and may be used as a steady rest or pressure bar when cutting large keyways. This end may be removed and a set screw fitted in its place for some work. Tools of various descriptions may be used for special work. When small work is to be shaped, forge a tool of ⅝" round steel which fits the hole in the bar. For small die and tool work, a tool holder somewhat smaller in dimensions is very handy.



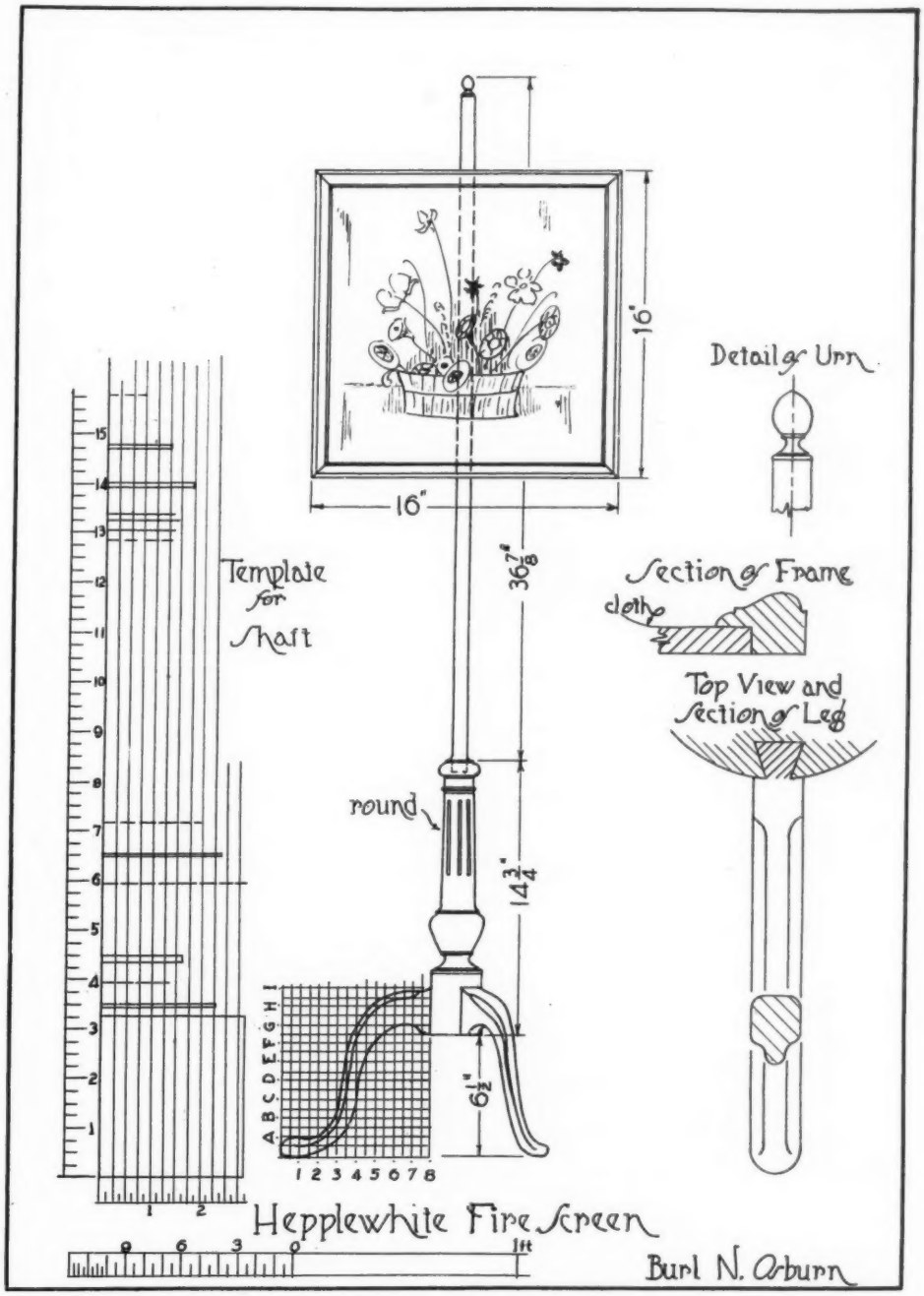
DETAILS OF INTERNAL SHAPER TOOL.

HEPPLEWHITE FIRE SCREEN.

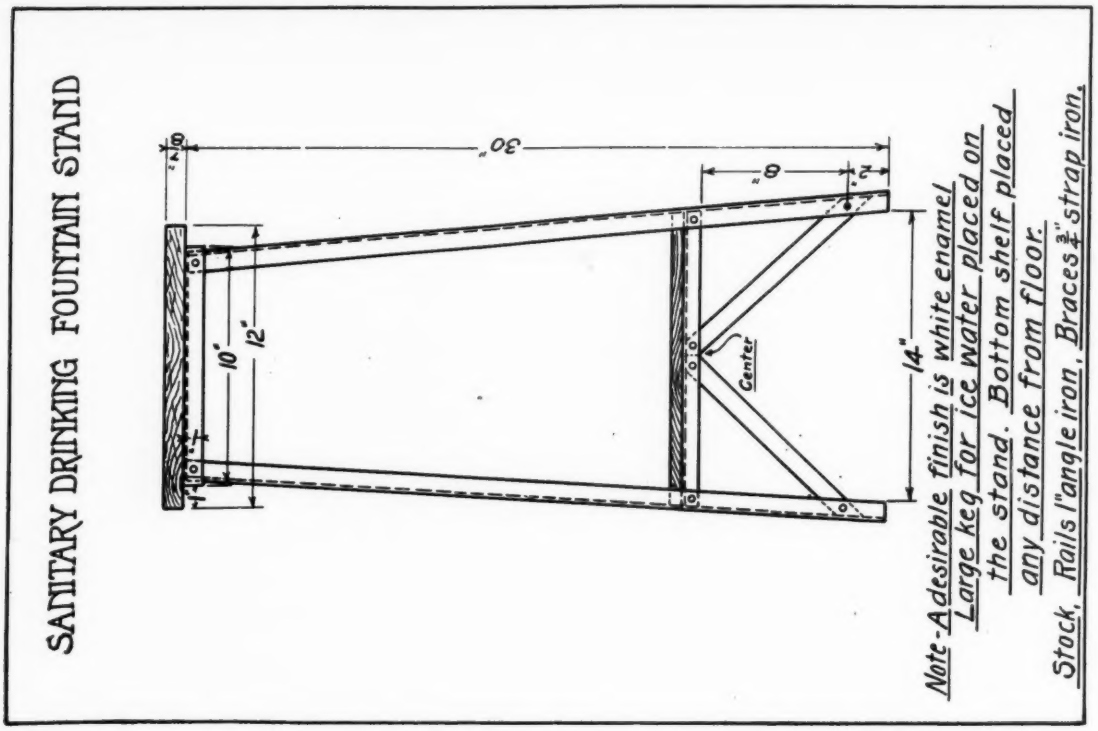
Burl N. Osburn, Cedar Falls, Iowa.

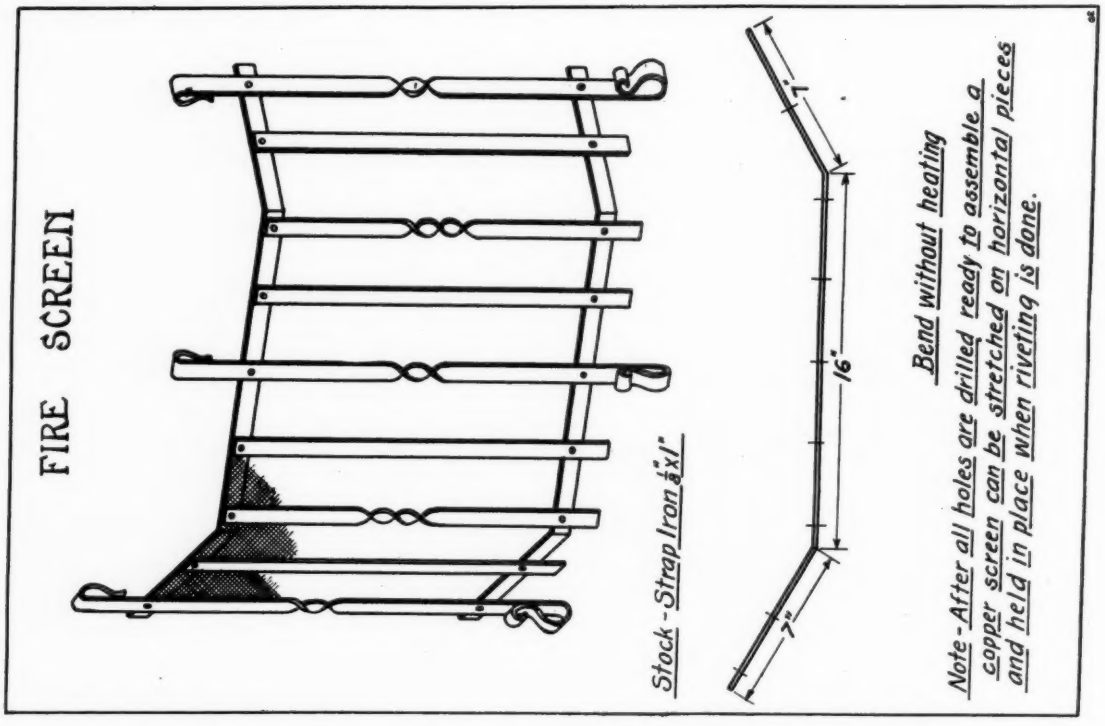
This fire screen, the design of which is attributed to Hepplewhite, is of the variety known as a pole screen. It is meant to be used as a protection to one who sits before an open fireplace. The cloth covered screen is adjustable so that it may be fastened at any desired point by means of a brass plate and thumb-screw attachment. The tripod base is made up of very plain legs dovetailed into the turned and fluted shaft. The pole, which fits into the top of the shaft, is of uniform diameter along its entire length, and is surmounted by a turned finial urn. The screen shown here is square, but may correctly be rectangular, round, oval, or shield-shape. It consists of a moulded frame, with a thin wooden back covered by tapestry, brocade, or some type of needlework.

To turn the shaft, make a template of strong cardboard or wood a little longer than the shaft. Mark off along one straight edge the points indicating the intersection of the curves of the shaft; these points are shown by solid lines on the detail. Next, locate the points showing the diameters of the coves and other parts of the shaft; these are shown by the dotted lines. Draw lines through these points, at right angles to the edge, that will



DETAILS OF WOOD FIRE SCREEN.




FIRE SCREEN
Stock - Strap Iron ⅛x1"
7"
16"
7"
Bend without heating
Note - After all holes are drilled ready to assemble a
copper screen can be stretched on horizontal pieces
and held in place when riveting is done.

be as long as the diameter at that point. The desired points may then be transfered to the revolving shaft and the ends of the calipers set as far apart as the length of the lines at that point indicates.

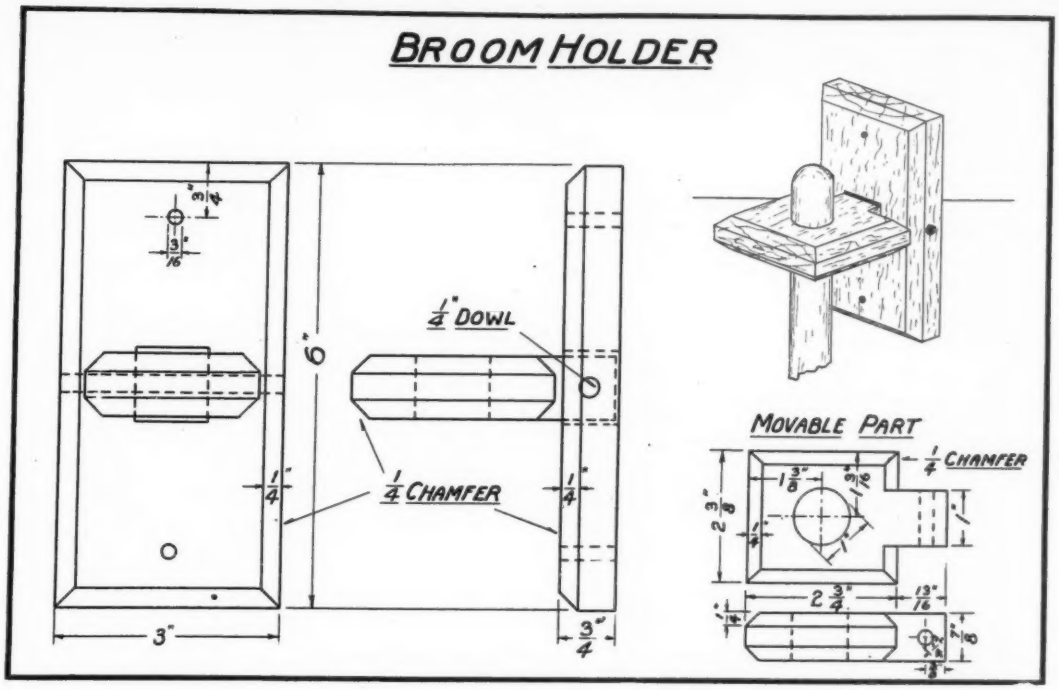
SANITARY FOUNTAIN STAND.

F. D. Connard, Webster Groves, Mo.

This is essentially an industrial problem. The construction involves only cold bending and riveting and the finished problem can readily be sold for office or store uses.

FIRE SCREEN

This problem is made entirely of ⅛ x 1 strap iron. All bending can be done by bending cold and original designs may be used.



A GRADE PROJECT DESIGNED BY F. I. SOLAR, DETROIT, MICH.

OIL FINISHING WALNUT.

Charles W. Frost, Dillon, Mont.

THE best finish ever devised for walnut, (be it American, English, French, Italian, or Circassian), is the oil polish used by the leading English and German gunmakers on their higher grade rifle and shotgun stocks.

This finish brings out the full beauty of the wood's grain and color as no other can. It penetrates more deeply, and does not show scratches or dents as varnish does. It is also the cheapest, satisfactory finish known, and is especially desirable for manual-training-shop use, because it can be applied in the work room without damage from rust.

The process of finishing with oil is very simple.

First—Scrape and sandpaper the surface to be finished as smooth as they can be made.

Second—Raise the grain by wetting with hot water.

Third—Smooth the surfaces, (*after* they dry,) with fine, worn, sandpaper.

Fourth—Continue alternately raising the grain and **smoothing with the worn sandpaper until neither heat nor** moisture has any effect upon the surface of the wood.

Fifth—Apply a heavy coat of finishing oil, (equal parts of boiled linseed oil and turpentine), and allow to stand over night. In the morning this will be almost, if not quite, absorbed.

Sixth—With a piece of heavy, lintless cloth rub over all the surfaces—removing *all* traces of oil. Be especially careful to work well up into the corners.

Seventh—Continue these processes night and morning until the wood cannot absorb any more oil. This point has been reached when the oil forms a thin, glossy, coat over the surface. This must also be rubbed completely off, as it is the oil contained in the pores of the wood, not that on the surface, that constitutes the much admired finish.

Eighth—A thin coat of petroleum, ("parafine"), oil, rubbed down with a soft flannel pad, completes the process.

Unlike a varnished piece, one finished with oil acquires a richer, deeper, more beautiful color and polish the older it gets and the more it is handled. Its freshness can also be at anytime renewed by a coat of petroleum oil and a few minutes' work with the rubbing pad.

The oil finish can, of course, be used as well after the wood is stained as upon the bare wood, if it is thought desirable to stain the walnut to match other pieces or to kill the "blue" tinge.

RECORDS AND THE SCHOOL SHOP.

Kenneth R. LaVoy, Instructor of Wood Working, Hudson High School, Hudson, N. Y.

We have heard and read a great deal about the need of keeping records of work done and progess made and

DATE ORDERED ..... DUE: .....

INDUSTRIAL DEPARTMENT
Hudson High School
PRODUCTION SHEET

JOB ..... COMMENCED BY .....

FILL OUT IF WORK IS ON PRODUCTION BASIS.

TIME RECORD.

Workman	Date	Hours	Minutes	Quality of Work
..	..	..	..	
..	..	..	..	
..	..	..	..	
..	..	..	..	
..	..	..	..	
..	..	..	..	

Total Hours ..... Min. .....

A stock sheet must be made out on all jobs.

An accurate record of time taken on jobs must be kept.

The receipt on opposite side must be filled out and properly signed before projects are taken from the shop.

PROJECT ..... DATE FINISHED .....

STOCK SHEET
INDUSTRIAL DEPARTMENT
Hudson High School, Hudson, N. Y.

ORDER NO. .....
BLUE PRINT NO. .....

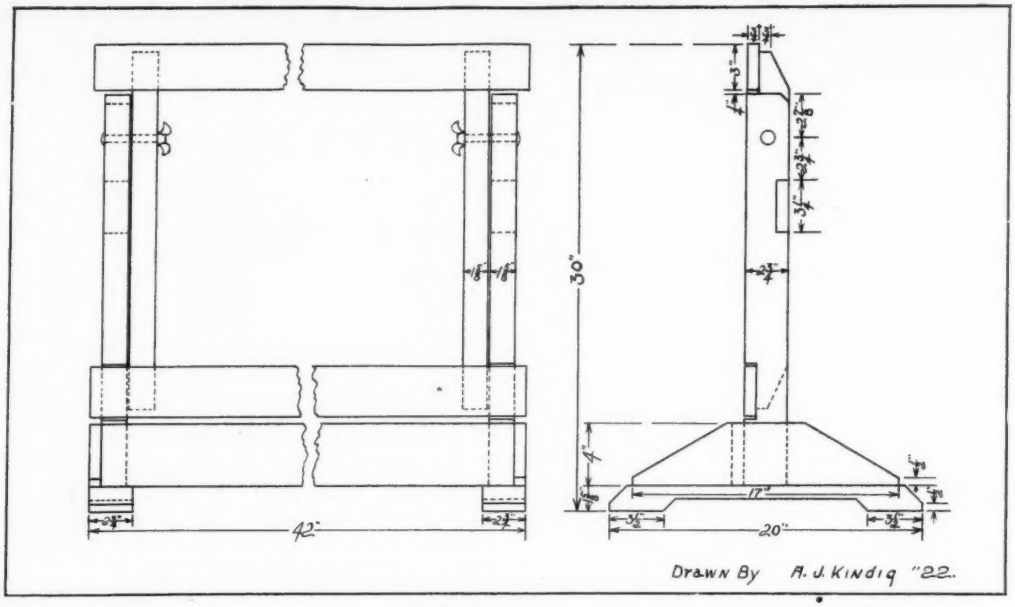
THE FOLLOWING MATERIALS ARE NEEDED FOR THIS JOB:

Material	Quan.	Part	Dimensions	Board Feet	Price	Total

NAME OF PUPIL ..... COST OF MATERIAL .....
GRADE OF WORK ..... ADD 10 PER CENT FOR WASTE .....
TOTAL TIME ..... SELLING PRICE .....

Shop ..... Received of .....
..... Instructor's O.K. The Sum of ..... Dollars in payment for above.
Date ..... Student Clerk

PRODUCTION AND STOCK RECORD SHEET.



DETAILS OF HURDLE.

many elaborate schemes and systems have been devised. A system that is too elaborate and that requires too much of the instructor's time will soon be thrown in the discard.

In planning our record card for use in the industrial department of the Hudson high school we first outlined what we considered necessary for a complete record. Listed in order of importance they are:

1. Record of jobs or projects.
2. Record of pupil doing job and quality of work.
3. Record of stock used.
4. Time taken for job.
5. Record of sale.

In my opinion the stock record and production sheet we now use combined with a progress chart comprise all the information needed for record.

A HURDLE.

L. B. Perry, Supervisor of Manual Training, Rochester, Indiana.

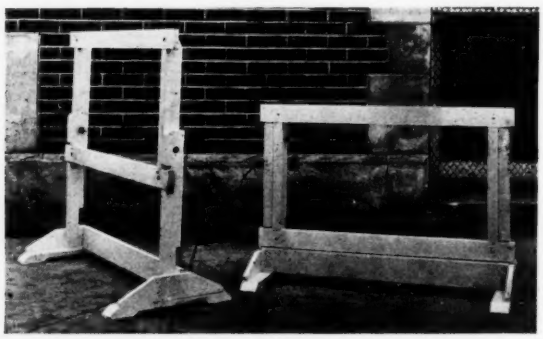
The accompanying drawing and photograph illustrates the hurdles built by the boys of our manual training department. Sixty of these were made at a cost of approximately $45.

The hurdles were designed and made to swing quickly from low to high hurdle and to conform to rules and regulations of the National Collegiate Athletic Association, as follows: "The gates for high hurdles shall be rigid; bases or feet of each shall be not less than twenty inches broad; the top bar shall be at least three inches wide and 42 inches long; the weight shall be approximately sixteen pounds."

These hurdles were made of yellow pine and given two coats of white paint before being assembled. All the work was done on a variety saw, but could be done as well on a band-saw.

In place of the usual long rod, short bolts with wing nuts were used at a considerable saving. The wing nuts are tightened to make the gates rigid for high hurdle.

The drawing and photograph will fully explain the method of construction.

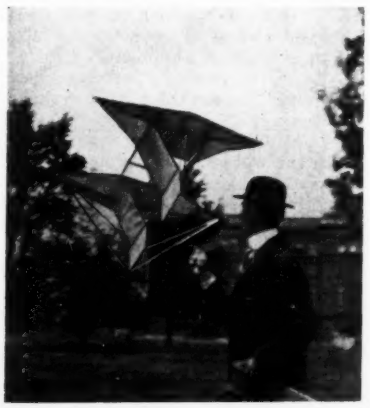


THE HURDLE ADJUSTED FOR HIGH AND LOW JUMPING RESPECTIVELY.

A KITE FOR VACATION.

H. C. Givens, Little Rock, Ark.

For making the kite illustrated little explanation is necessary. Start by constructing a frame the same as if two bow kites were to be built tail to tail. Attach tri-



angular frame with sides equal to one third of the width of the kite, the top members to project as shown. Brace and frame for stabilizing surface which projects directly below.

After the frame is constructed and stiffened several surface arrangements are possible, some of which have interesting features for study. In the illustration the ability of the kite to fly directly from the hand can be noted. The position which this kite assumes in various winds, and the relation of its lifting power to the total surface, are also points of interest.

CIRCULAR SAW FITTING.

(Complete Outline of General Information.)

L. W. Kunkle.

Definition of Fitting.—Saws are fitted by the manufacturer, but the term fitting as used technically in the shop is to refit the saw, by performing all the necessary operations to make the saw efficiently suitable for its intended use or work. It may involve all, one, or several of the operations listed in the outline.

I. Top Jointing.

A. Clean dust and grease off from collars and arbor.

B. Place the saw on the arbor, the teeth towards the rotating direction of the machine, with the trade mark of the saw up.

C. Put on collar and nut, and tighten.

Note—The nut and arbor have a left hand thread. Use a wrench that fits the nut, and strike a few blows with the hand at the end of the wrench to tighten the nut.

D. Lower or raise the saw or table until the top of the table is tangent to the circumference or the line of the tooth points.

E. Using a piece of broken emery wheel, lay the emery wheel flat on the table, and pass it back and forth over the teeth in a circular and sideward motion.

F. Raise or lower the saw or table, and top joint the teeth until all of the teeth have been touched.

II. Laying out.

Note—Laying out of a saw for fitting is necessary only for a beginner or an inexperienced hand at saw fitting; or in case the saw is to be retoothed.

A. Using the following solution, coat the saw on its loose collar side. Pour on a little of the solution at a time. Do not spread the solution by rubbing, but by turning and raising or lowering the saw to allow the solution to flow freely over the entire face.

Solution—1 oz. Cu. S. O_4, 8 oz. H_2O, 3 drops $H_2S.O_4$.

B. Scribe on a smooth surfaced board a circle, the diameter of which equals the diameter of the saw. From the same center scribe another circle, the diameter of which equals the diameter of the arbor hole in the saw. In the circumference of the latter circle drive three brads in a tripod formation to hold the saw in place.

C. Divide the circumference of the larger circle into the same number of equal spaces as there are tooth points on the saw or the number to be desired.

D. Place the saw on the board, the face having the solution up, so that as many as possible of the tooth points coincide with the points laid out in the circumference of the larger circle.

E. For the various kinds of saws follow the drawings and directions given for laying out the teeth.

III. Gumming (Gulleting or chambering).

Note—Not always required in refitting the saw.

A. Hand Gumming.

1. Follow the line of centers for the gullets as per drawings and directions.

Note—Finish saws and the finer tooth saws are not chambered.

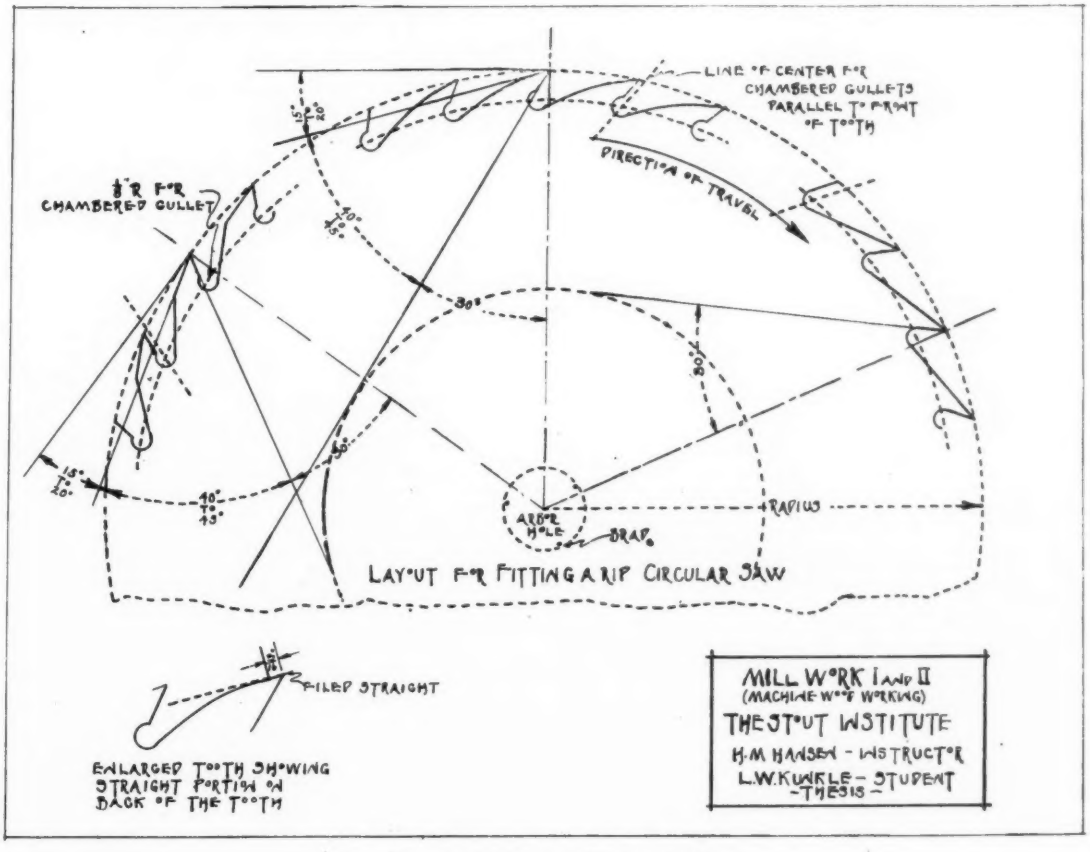
B. Automatic Machine Gulleting.

IV. Rough Filing.

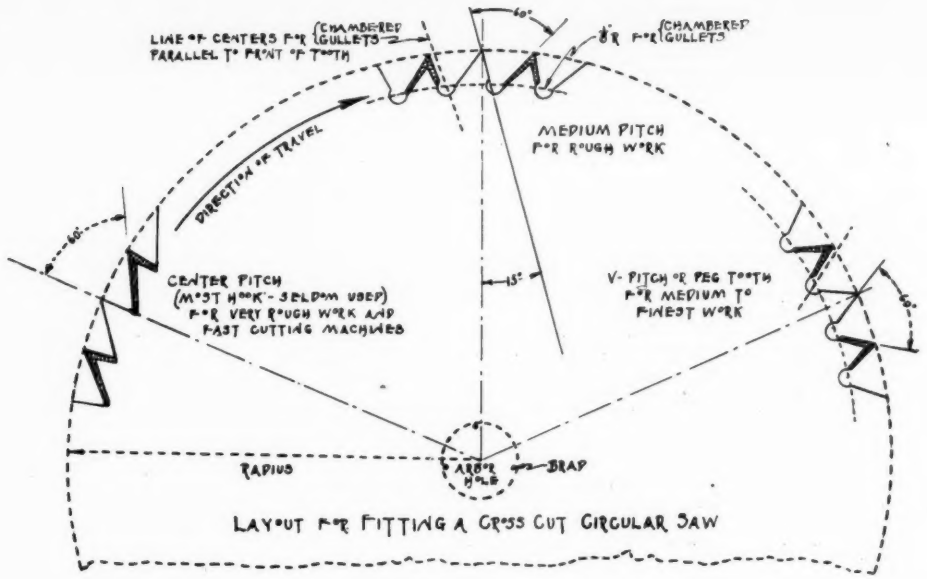
A. Cross cut, combination, and dado head saws are filed as per layout or to the desired pitch or angle.

B. Place the saw in vise for filing. Use a three cornered band saw file.

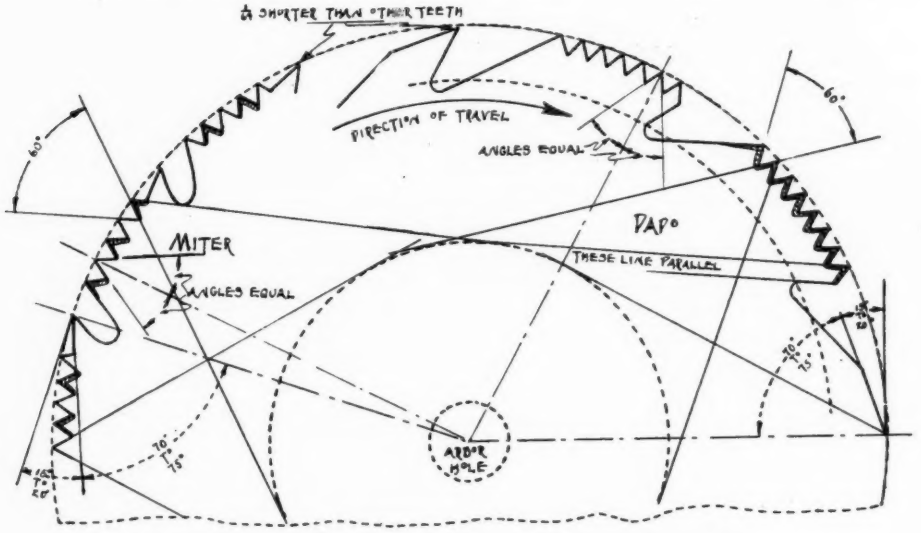
1. In filing saws for soft wood, the handle of the file is carried lower than the point of the file.



LAYOUT FOR FITTING A RIP SAW.


LINE OF CENTERS FOR (CHAMBERED GULLETS) PARALLEL TO FRONT OF TOOTH
OR FOR (CHAMBERED GULLETS)
60°
MEDIUM PITCH FOR ROUGH WORK
DIRECTION OF TRAVEL
60°
CENTER PITCH (MOST HOOK - SELDOM USED) FOR VERY ROUGH WORK AND FAST CUTTING MACHINES
15°
V- PITCH OR PEG TOOTH FOR MEDIUM TO FINEST WORK
60°
RADIUS
ARBOR HOLE
BEAD

LAYOUT FOR FITTING A CROSS CUT CIRCULAR SAW



LAYOUT FOR FITTING DADO AND MITER CIRCULAR SAWS.

2. For hard wood the handle of the file is carried on about the same level as the point of the file, providing the saw is held plumb in the vise.

C. Alternate teeth are filed from one side of the saw and the saw is reversed to file the other teeth. This is advisable even when filing rip teeth with square dress. To obtain the bevel on the front and back, or both front and back, of the teeth, the file is carried to right or left about 45 to 55 degrees to the face of the saw.

D. Rip saws which are to be swaged are filed as per gauge and about three-sixteenths of an inch back of the point on the back of the teeth. (See drawings.)
   1. Swaged saw teeth should have square dress; that is, they should be filed straight across on the front and back of the teeth so that the cutting edge of the tooth is at right angles to the face of the saw.
   2. Spring set and brier dressed saw teeth are filed straight on the front and beveled on the back of the teeth.

V. **Setting and Swaging.**
   Note—As some saws are hollow ground, they require no set or swage, being used as finish saws for dry lumber.
   A. Spring set. (Rip and cross cut saws.)
      1. Setting-stake, or hammer and anvil.
      2. Hand set.
      3. (Disston) Samson Set.
      4. Set gauge for gauging equal set on both sides of saw.
   B. Swaging. (Rip saws only, for rough work.)
      1. Swaging bar and hammer.
      2. Jumper or upset swage.
      3. Eccentric.

VI. **Rejointing**—This operation is necessary only for the inexperienced hand at saw fitting as in swaging some teeth may be made shorter than others.

VII. **Finish Filing or Pointing Up.**
   A. File all teeth to a keen point, taking care to file out only the marks made by the stone in jointing, and to file the teeth to the same angles as in rough filing.

VIII. **Side Dressing.** (Shapening and lining up of teeth if swaged.)

A. Swaged teeth.
   1. Shaper and gauge.
   2. Side dressing tool.
B. Spring set.
   1. Side dressing tool.
C. No set for hollow ground saws.
   1. Oil stone.

IX. Testing. (For results of fitting.)
A. Side clearance.
B. Cutting clearance.
C. Like length and set of teeth on both sides.

Editor's Note—The following article is the outline of a thesis prepared by Mr. L. W. Kunkle, Sophomore student at The Stout Institute, under the direction of Mr. H. M. Hansen, instructor in millwork, cabinetmaking and carpentry at The Stout Institute.

INDUSTRIAL EDUCATION AT THE N. E. A., BOSTON.

The National Education Association gave comparatively little attention to the problems of industrial and vocational education during its convention in Boston, July 1-8. The subject was not touched upon in any of the general sessions or in the resolutions. The Department of Vocational Education and Practical Arts held one session on Wednesday afternoon, under the chairmanship of Mr. L. H. Dennis of Harrisburg, Pa.

The topic "Economic Necessity and Vocational Education" was discussed by Prof. Emery Filbey of the University of Chicago.

Dr. Robert O. Small of the Massachusetts State Department of Education, spoke on "Part-Time Industrial Education."

In discussing industrial education for rural communities, State Supt. A. O. Thomas of Maine, said in part:

"It is a much more difficult problem to provide suitable form of Industrial Education for rural than for urban communities. The problem of Industrial Education for urban schools has become greatly simplified in recent years and much very fine work is being accomplished.

"There are and must be for many years a large number of small single-teacher schools. Isolated communities are unwilling to give up the small school especially where distances make transportation difficult. This will necessitate the finding of some form of work for the one-teacher school. In Maine it consists of providing bench and tools, for elementary industrial work and materials for hot luncheons which support definite instruction in the subject of home economics. They also take up the work of the various agricultural, home economics clubs and are getting information and habits which must ultimately make for better rural life.

"In the consolidated school the subject is becoming much easier and much more satisfactory. The new type of rural school has its laboratories, its shops, its diversified course of rural study the same as the urban school. Agriculture and home economics are the chief features. These are being developed on the vocational type. It is not every country child, however, who wishes to become an agriculturist or a housekeeper. There should be no bar put up keeping the country child who has adaptability for some other line of work, on the farm nor should there be a bar put up to keep those in the cities from going out to the free open country.

"Maine is developing a very interesting experiment. The Legislative session of 1919 placed in the hands of the State Board for Vocational Education an appropriation which may be used for the purpose of organizing and conducting short courses in industrial subjects for rural communities. In Maine we have many towns located at a distance from railroad and larger villages. They are strictly rural communities. Many of them are sparsely settled and do not have adequate high school facilities of their own. Under this arrangement short courses of four to six weeks may be set up in agriculture and home economics. The work is conducted entirely on a unit plan. One year may be animal husbandry, another horticulture, etc. In a period of years this rotation school will bring to the community the rudiments of the agricultural subjects. A corps of instructors is provided and also a complete cabinet of apparatus and equipment necessary to illustrate the phases taught. Persons taking these courses have six months supervised agriculture on a practical basis."

The department elected as its officers for 1922-23 the following:

L. H. Dennis, Harrisburg, Pa., President; Benjamin W. Johnson, University of California, Vice-President; C. C. Colvin of Illinois, Recording Secretary; Leigh J. Rodgers of Wentworth Institute, Corresponding Secretary.

Following the meeting, members of the Department were guests of the trustees and directors of Wentworth Institute at an informal reception. Those present representing the Institute were Director and Mrs. Paul B. Watson, F. E. Dobbs, Principal Arthur L. Williston, and Treasurer C. W. Tudbury.

"Vocational Guidance" was the topic of a paper by Mr. H. E. Stone, formerly Director of Guidance at Erie, Pa., before the Department of School Administration.

The Massachusetts vocational and continuation schools showed extensive exhibits of shop and academic work at the Boys' Trade School. The Boston schools showed similar work in the Girls' Latin School. Wentworth Institute held open house during the week.

A message of Secretary of State Charles E. Hughes to the N. E. A. contained the following references to vocational education:

"It is not likely that there will be lack of opportunity for vocational education—for the sort of training which will fit men and women to earn a living. The exigencies of our complex life are too apparent and the rewards too obvious to admit of neglect, and we shall have whatever vocational or technical schools are required. But democracy cannot live on bread alone. It is not enough that one shall be able to earn a living or a good living. This is the foundation, but not the structure. What is needed is to have life more abundantly."

Vocational Guidance.

Previous to the convention of the N. E. A., the National Vocational Guidance Association held a session at Wentworth Institute. Dr. John M. Brewer of Harvard University, urged the extension of vocational guidance as a means of self-discovery for the child. Other speakers at this meeting were Miss Anna D. Pratt of Philadelphia, "Home Problems in Relation to Vocational Guidance;" Miss Edith Campbell of Cincinnati, O., "Cumulative Record Cards;" Miss Mary Stewart of Washington, "Placement;" Miss Ruth Swan Clark of New York, "Contribution of the Psychologists to Vocational Guidance." Frederick J. Allen of Harvard University, president of the society, presided.

A SUCCESSFUL PROJECT

"Cleveland Guide Book" is the title of a 16 mo cloth bound volume of 116 pages, issued by the Empire Junior High School as a project in academic and industrial arts class work. The preceding bare statement of fact does not give a clue to the very interesting and useful character of the book or to the series of valuable educational elements which it involved. The book is a real guide book, with a vast amount of useful information for strangers and "home" people. It is divided into eight general sections; general information, aids to travelers, business information, recreation and amusements, educational institutions, social service, industrial activities and civic and historical facts. It is carefully indexed, well arranged for ready reference and accompanied with a map of the city.

The entire book was written and compiled by children in the seventh and eighth grades from well-authenticated publications and from persons of authority. The work was done in the English, geography and history classes, as regular seventh grade work. The historical section was handled in part by eighth grade pupils. The classes in typewriting prepared the material for the printing classes and the latter, made of eighth and ninth grade boys, set the type, locked up the forms and operated the presses. A considerable part of the proof-reading was done in class. The cover design was made by the art classes and the book was bound by a seventh A grade pupil.

The book compares well with the average commercial product. The pages are well balanced and the emphasis of display is correctly placed. The paper is chosen for repeated handling and the flexible binding is durable. It should be no task to sell the edition of one thousand copies.

Much credit for the supervision of the work is due the teachers and Principal R. Wise.

SECURING "GOODWILL" IN THE COMMUNITY.

Frank S. Pugh, Supervisor of Industrial Education, Kauai, T. H.

The new teacher or supervisor upon assignment to his position will often find indifference and opposition to his plans until he can secure the cooperation and "goodwill" of his new community. This opposition may have been caused by the indifferent work of his predecessors, by the fact that industrial education is costly when compared with its tangible and immediate results; or it may be simply because industrial education has been thrust upon the community before it has been "sold" to the people.

Success in industrial education will depend mostly upon the enthusiastic cooperation and help that the new teacher can secure from his community. It is certain that the necessary supplies, buildings, tools, or machinery will not be forthcoming except in limited amounts, if there is any general oppositon to industrial education.

The problem, then, is, how can a teacher or supervisor secure this "goodwill" and cooperation? Some men can secure it because of a pleasing personality, but those of us without this asset must secure it through hard work.

The solution that the writer has found most successful is that of giving "service" to the community in general. This can be given in many ways but all invariably will be appreciated by the community. Projects that the shop-classes can do, such as the making of street and road signs, the building of small public buildings, the construction of concrete park seats, monuments, milestones or the marking of historical sites, will greatly interest the public and also help to solve the problem of just what to do to interest your students.

The new teacher or supervisor should endeavor to secure membership in all public bodies such as the local chamber of commerce, the Rotary Club, the automobile club, etc., and take an active part in the work that they are doing. These teachers who served in the World War will find considerable opportunity to be of service through membership in the American Legion also.

One can talk over possible means of service with the presidents of these bodies and they will generally be found able and willing to secure the necessary funds to carry out the projects of service. The town or county government is generally only too willing to provide funds for the making of road or street signs, mile-stones, or concrete park seats. However, it is advisable to work through the local automobile club or the chamber of commerce. It is also essential that any project taken up by the school be finished in thoroughly workmanlike manner.

The local newspapers will generally appreciate a weekly report of any work the schools are doing. The publicity afforded helps the cause of industrial education greatly. However, the students are generally the best "press agents" of the new teacher's work.

There is considerable extra time and effort entailed in "putting across" this program of "service," but the resultant in the form of "goodwill" and increased appropriations for industrial education is well worth it.

MAKE PLANS FOR JOINT CONVENTION.

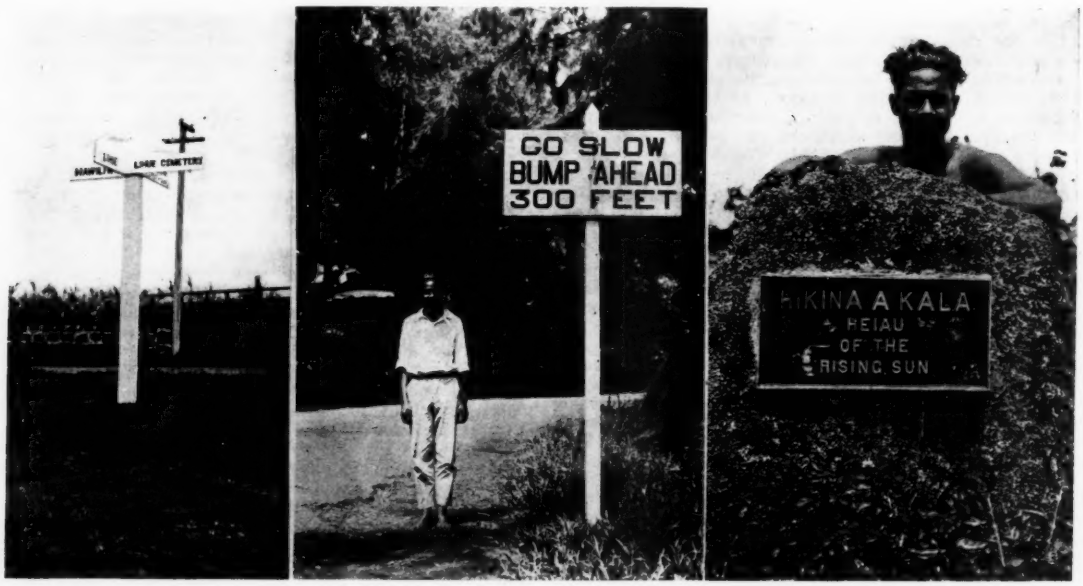
The National Society for Vocational Education and the Vocational Education Association of the Middle West have joined to hold a convention at Detroit, November 27 to December 2. The National Vocational Guidance Association will also meet with the two major organizations.

The plans for the convention are being rapidly matured by Mr. L. A. Wilson and Mr. C. C. Bacharach, presidents of the National and Middle West associations respectively. In effect these provide for a Vocational Education Week.

The general sessions, the exhibits, and many of the departmental meetings will be held in the Cass Technical High School, the new building of which has just been completed and put in service. The schedule of meetings for the week is as follows:

November 27 and 28—General regional conferences of vocational school officers of the eastern and middle-western states, to be arranged and held under the auspices of the Federal Board for Vocational Education.

November 29—Conference dinner meetings arranged under the auspices of the United States Bureau of Education. The dinner for persons interested in industrial education will be conducted by Dr. W. T. Bawden; for those interested in commercial education by Mr. Glen L. Swiggett.



1. The first road sign ever erected on the Island of Kauai, Hawaii. It was made from scrap lumber contributed by the boys of Lihue Graded School.
2. One of 19 road signs painted, lettered and erected by grade classes of Kauai, Territory of Hawaii. The material was furnished by the local County Government with the aid of the Automobile Club.
3. One of the many old Hawaiian temple sites that is famous in Kauai history and one of the first to be marked by the schools of Kauai through the aid of the Kauai Historical Society.

November 30 to December 2, inc.—Joint convention and exhibit of the National Society for Vocational Education, the Vocational Education Association of the Middle West and the National Vocational Guidance Association.

The Cass Technical School has an auditorium with a seating capacity of 3,400, eight or ten rooms seating 200 each, and four gymnasiums for commercial exhibits.

NEW BOOKS.

Machine Tool Operation.

By Henry D. Burghardt, Part 11, Cloth, 438 pages, Illustrated. McGraw-Hill Book Co., New York, N. Y.

In book one of this work the author took up lathe-bench and forge work and in the present book (two) he advances to the drilling machine, shaper, planer, milling machine and grinder. As in the former book principles of construction and operation are described in simple, elementary shop language so that the student or apprentice may get a complete understanding of principles of typical mechanisms and of their typical use.

The author has drawn on his shop experience and still longer teaching experience to make the book of splendid teaching value. Each section opens with a detailed description of the purposes and principles of construction of the machine. Then follow detailed discussions of ordinary set ups and operations and finally typical special operations are illustrated and described. A final chapter of the book is devoted to gears and gear cutting.

Each major topic of every chapter is followed by questions based on the text and on practical machine-shop work. The purpose is to bring out the application of principles and to cause the student to constantly relate his experiences to correct theory. An appendix provides useful tables of weights and measures, gear and screw threads and miscellaneous shop information.

An Introduction to the Graphic Language.

By Gardner C. Anthony. Cloth, 168 pages. D. C. Heath & Co., New York.

This book explains in detail the vocabulary, grammatical construction, idiomatic peculiarities and common usages of the graphic language used by American engineers, architects, map makers, statisticians, and draftsmen of all kinds. It offers a reading course in a subject that is invariably studied, at the drawing board, by solving a series of problems or plates in which the most common principles alone are illustrated. The generally used methods of teaching mechanical drawing rarely carry the student beyond the geometry and the penmanship of the subjejct and very, very rarely give him a glimpse into the whole field of graphic representation.

The present book provides an immense amount of information in a most interesting and connected manner. It opens with a series of simple drawings which are to be read, and then outlines the historic development of graphic drawing from the middle ages to the present. The various special kinds of drawing are then described and illustrated.

The value of the book as we see it lies chiefly in conveying to the student the idea that drawings must be made primarily to be read, that there is a common vocabulary which every draftsman in whatever land or field of work used, and that the graphic language is the principal means for developing and recording technical ideas, inventions, facts, theories, all of which is beyond the written and spoken literary languages.

The final chapters include detailed instructions on the use of drawing instruments, the solution of geometric problems and lettering. The standard symbols of the various engineering and industrial organizations of the United States appear in an appendix.

Construction of Radio Receiving Sets.

L. D. Perry and R. O. Buck. Cloth, octavo, 72 pages. Price 90 cents. The Bruce Publishing Co., Milwaukee, Wis.

Two experienced teachers have joined forces in the preparation of this useful and timely book. It presents step by step the construction of two sets of radio receiving apparatus. The book opens with a very simple explanation of the nature of radio communication, radio waves and wave frequencies. Brief chapters are devoted to the essentials of radio receiving sets and to deficiencies of radio terms. The functions of the several units or parts of typical sets is described. The book then takes up in detail the construction of a loose coupler set. Complete detailed drawings are provided for the construction of the wood and metal parts of the outfit and for the wiring and the assembly of the several pieces. The final chapters of the book take up the making of a vario coupler set and of a receiving set with variometers. Both outfits are fully illustrated with complete working drawings and details for making each part. The book should appeal to teachers of manual training and of science, not only because of its completeness and because of the up-to-dateness of the outfits shown, but also because of the splendid teaching form in which the subject is presented.

A Measuring Scale for Freehand Drawing.

By Linus W. Kline and Gertrude L. Carey. Paper, 61 pages, illustrated. Price $2. Johns Hopkins Press, Baltimore, Md.

This book records the experiment of the authors in seeking to develop a measuring scale for judging freehand drawing in the grades and in the high school.

In preparing the themes for the specimen drawings in which the study was based four subjects were assigned: a house, a rabbit and a brush drawing of a tree. Each of these was chosen not simply because it afforded a common object that would readily test the child's ability in representation, but because it involved the factors of design, composition and color as well. Thus the house necessarily includes perspective; the rabbit expresses action, growth and texture. The human figure presents motion, action, growth of a living form. The tree requires color and form proportion, etc. Upward of five thousand children prepared drawings for the scale and their work was submitted to 92 judges for classification. The final pictures as chosen for the scale represent the ultimate judgment of the authors and are in exact accord with the findings of the great majority of the judges.

The scale is in simple form so that it may be used by any teacher. The average and median scores for the several grades are given for comparison.

Kite Tournament. Under the direction of Mr. E. B. Kent, Director of Manual Arts at Jersey City, N. J., a kite tournament for boys was held at the West Side Park, Saturday, May 27th. The tournament had for its aim the creation of interest among the boys in the kite as a constructive problem, and the adaptation of the project as an outdoor pastime.

In connection with the tournament, the local Rotary Club offered to furnish first and second prize medals for the individual events and cups for the school events. Prizes were given for the largest, smallest and highest flying kites and a cup was awarded to the school having the largest number of kites in the air at a specified time. The kites were made of tissue paper, wrapping paper and newspapers, the last two materials proving the most durable for flying on windy days. The bow kite, or eddy kite was recommended to those without manual training experience, as it is the easiest to make and also to fly.

The tournament proved a great success, despite the gale of wind which arose and nearly wrecked the tissue paper kites before they reached the park. The boys who had used wrapping paper or newspaper for covering the kites were left with an almost clear field after the wind had done its worst. The awards were made by the judges on the following:

Largest kite—first (8 ft. 1 in.); second (6 ft.)
Highest flying—first and second.
Most unique—first and second.
Highest flying—36 in.—first and second.
Best box kite—first and second.
Highest flying—24 in.—first and second.
Smallest—first and second.
Highest flying—tetrahedral—first and second.
Largest number in air—first and second.

The school cup contest had the advantage of appealing to group rather than individual effort. It gave the owner of the crudest and clumsiest kite that would fly at all, an opportunity to have a real share in the contest and appealed in this way to the younger boys as well as to those in the manual training classes. It resulted in the building of about a thousand kites by boys not in manual training classes, in addition to more than a thousand which were built wholly or in part in the school shops. This proved to be more of an achievement than any stimulus to building of high grade kites by a few.

NOW, ARE THERE ANY QUESTIONS?

This department is intended for subscribers who have problems which trouble them. The editors will reply to questions, which they feel they can answer, and to other questions they will obtain replies from competent authorities. Letters must invariably be signed with full name of inquirer. All questions are numbered in the order of their receipt. If an answer is desired by mail, a stamped envelope should be enclosed. The privilege of printing any reply is reserved. Address, Industrial-Arts Magazine, Milwaukee, Wis.

Refinishing Stickley's Craftman Furniture.

293. Q:—I would like to refinish a set of Stickley's Craftsman Furniture. This furniture has its original finish of fumed oak. I believe there is a banana oil covering over the surface. I take this to be banana oil because the polish furnished by the manufacturers contains banana oil.

It is my desire to finish this set in a Delft blue, retaining, here and there, some of the original fumed oak color. I had thought that if I could remove this banana oil finish, I could apply a Masury Coach color, ground in Japan, this would give me a flat blue.

Can this be applied over the lacquer finish of the furniture in the present state? What can I use afterward to give a soft finish to this Delft blue and yet not get a glossy, enamel appearance? What can you recommend other than Masury's Coach color that would give me what I am after? I had thought of applying a flat white, to which I had applied the blue color, but feared that this would give me the results that the Coach color would.—A. F. R.

A:—The set of Stickley Craftsman furniture should best be refinished with a spray gun since it is almost impossible to get the high lighting and shading out effects with brush work. I very much doubt the practicability of using either a flat white tinted with coach color or any other method calling for hand work. At the factory this two-toned color effect is accomplished by spraying Dupont enamel lacquers, tinted to the desired color and all portions which would naturally show a high light are missed entirely by this spray thereby enabling the fume or other color to show through. Since the shading work with the gun can be done so as to produce either a heavy coat or fine mist-like effect. Unless you have this spray gun equipment, I would seriously advise you not to attempt to do the work with a brush since the desired effect cannot be obtained other than with gun cotton lacquer enamels and the air gun cotton lacquer enamels and the air gun.—**Ralph G. Waring.**

Varnish Troubles.

294. Q:—I would like to know the cause of trouble and remedy for a piano finish that has become roughened by the apparent bursting of small bubbles in the varnish. The piano is several years old, but has just begun to get rough. The room, to my knowledge, has at no time become overheated.—R. W. J.

A:—Within the last few years this type of trouble has come to my attention in several instances though not always with this type of defect. In this particular case it is apparent that a turpentine substitute of a petroleum distillate type had been used as a thinner for the filler coat. Due to the fact that even the largest companies are not accurate enough in the production of this distillate, enough high boiling fractions of the paraffin oil type find their way into the receiving tank with the result that there is always a residue which does not completely evaporate when a sample is exposed to the air. It is this trace of non-drying oil which gradually disintegrates the varnish over a pore and eventually shows itself as a broken blister. In cases where this condition is very marked, the resulting finish applied over such a foundation is very badly broken down and the only recourse is to entirely strip the case and refinish.

This may be accomplished by the use of varnish remover or by scraping. In the latter case sufficient sanding must be done to bring up an entire fresh surface and will necessitate restaining as well. When the stain coat is dry, a size coat of orange shellac reduced one-half with alcohol and tinted faintly red with alcohol soluble, Bismark brown should then be brushed on. If necessary a Silex filler tinted with Van Dyke brown, burnt umber and rose lake should be used to produce a chocolate brown color. This should be thinned to the consistency of milk with a mixture of two parts benzine and one part turpentine, brushed on across the grain and carefully cleaned off. The filler coat should be allowed to dry at least forty-eight hours. If necessary, both the shellac coat and filler coat may be sanded with a split 00000 paper. It is customary in piano factories to apply four coats of rubbing varnish and one coat of piano polishing in order to produce a standard finish, but as this latter type of varnish requires long experience, in the hands of an expert brusher, I do not recommend it for ordinary practice. It is preferable, therefore, to use a high grade rubbing and polishing varnish such as Pratt & Lambert or Valentine. The first two coats of varnish may be sanded but the last three should be rubbed with FF pumice stone, felt pad and water. After rubbing the last coat it should be allowed to stand twenty-four hours and then rubbed to a final polish with felt pad, rotten stone and water. After sponging off, clean up with a good polish. Unless a dust free room and constant heat at 75° to 80° F. can be maintained, it is inadvisable to attempt to do this job personally as a piano case will entail a tremendous amount of work on a refinished job. An average price for a standard refinish job in a piano warehouse averages around $100 depending upon whether the case is a Grand or Upright.—**Ralph G. Waring.**

Antique Finish on Cypress.

300. Q:—How can cypress be finished up to give an antique appearance? I am told that a very good effect can be given by first charring with a blow torch and then by various operations produce a good finish. Will you explain the method?—E. A. P.

A:—It is hard to tell just what you mean by antique appearance. In general woods become smooth and polished and for that reason it would seem more fitting to produce some soft shade of brown by staining and then apply one or more coats of varnish as a protection and still enable the surface to be rubbed smooth but not too highly polished. The real antiques which have come down to us from generation to generation, all give evidence of a great deal of painstaking care and work in the production of the finish and, therefore, it would seem best to avoid most of the fads and fancies now parading under the name of antique effects.

The blow torch or Sugi method was popularized to a limited extent by the Cypress Manufacturers' Association. It soon died out, however, due to the fact that it could not be produced except under extreme conditions not available to the ordinary mechanic. For instance work will prove a total failure through warping and checking, if more than one per cent of moisture exists in the board during the charring process by the blow torch. This, of course, necessitates very exact dry kiln practice not possible even in an up-to-date factory, since no one can afford to dry lumber to bone dryness. Were this possible and practical the effect would be soon destroyed due to the fact that lumber will normally and within a few hours time re-absorb up to ten per cent atmospheric moisure. In addition to this difficulty the work is as dirty as cleaning out a soft coal bin; while during the burning process gases and fumes are generated which cause great irritation to the eyes, nose and throat. It certainly is not to be recommended to manual training or trade school conditions. When all the hard work is done, an extremely rough surface is produced which makes a splendid dust catcher and hence soon becomes a great eyesore; this together with the fact that the partially charred wood, which has not been entirely removed by the butchers block steel brush, continues to powder out.—R. G. Waring.

Work of the St. Paul Vocational School. The St. Paul Vocational School, at St. Paul, Minn., is maintained by the city as part of the public-school system. The state and the federal governments furnish aid and supervise the courses.

The school enrolls only boys who are 14 years of age or over, who desire to learn a trade and who can show a satisfactory school record. The school offers a four-year course in the trades of carpentry, sheet metal work, mechanical drafting, cabinet making, pattern making, machine shop work, automobile mechanics, watch making, jewelry work and pattern making. Upon completion of the course the student receives a certificate of graduation. The school pays particular attention to the boys who complete the sixth grade and who are likely to leave school without any definite preparation in the way of a trade or vocation.